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श्रृंखला 1 मालधारक — प्रहस्तन एवं सुरक्षा

(दूसरा पुनरीक्षण)

Indian Standard

SERIES 1 FREIGHT CONTAINERS — HANDLING AND SECURING

(Second Revision)

ICS 55.180.10

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

October 2001 Price Group 10

Freight Containers and Pallets Sectional Committee, TED 12

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 3874 : 1997 'Series 1 freight containers — Handling and securing' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of Freight Containers and Pallets Sectional Committee and approval of the Transport Engineering Division Council.

This standard was first published in 1975. It was revised in 1991, alingning with ISO 3874 : 1988. Subsequent to the revised of ISO 3874 : 1997, this standard has been again revised to bring it in line with the revised ISO Standard.

The text of ISO Standard has been approved for publication as Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a full stop (.) as the decimal marker.

In the adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 668 : 1995	IS 6566 : 2001 Series 1 freight containers — Classification, dimensions and ratings	Identical
ISO 830 : 1981	IS 6569 : 1992 Freight containers — Terminology (*second revision*)	do
ISO 1161 : 1984	IS 7694 : 1992 Series 1 freight containers — Corner fittings — Specification (*second revision*)	do
ISO 1496-1 : 1990	IS 13288 (Part 1) : 1993 Series 1 freight containers — Specification and testing: Part 1 General cargo containers for general purposes	do
ISO 1496-2 : 1996	IS 13288 (Part 2) : 2001 Series 1 freight containers — Specification and testing: Part 2 Thermal containers (*first revision*)	do
ISO 1496-3 : 1995	IS 13288 (Part 3) : 2001 Series 1 freight containers — Specification and testing: Part 3 Tank containers for liquids, gases and pressurized dry bulk (*first revision*)	do
ISO 1496-4 : 1991	IS 13288 (Part 4) : 1993 Series 1 freight containers — Specification and testing: Part 4 Non pressurized containers for dry bulk	do
ISO 1496-5 : 1991	IS 13288 (Part 5) : 2001 Series 1 freight containers — Specification and testing: Part 5 Platform and platform-based containers (*first revision*)	do
ISO 6346 : 1995	IS 6928 : 2001 Freight containers — Coding, identification and marking (*third revision*)	do

AMENDMENT NO. 3 & 4 JANUARY 2010
TO
IS 7622 : 2001 SERIES 1 FREIGHT CONTAINERS — HANDLING AND SECURING

(Second Revision)

AMENDMENT 3: Double stack rail car operations

Page 28

Add a new 9.3.5 after the existing 9.3.4 as follows:

9.3.5 Double stack rail car operations

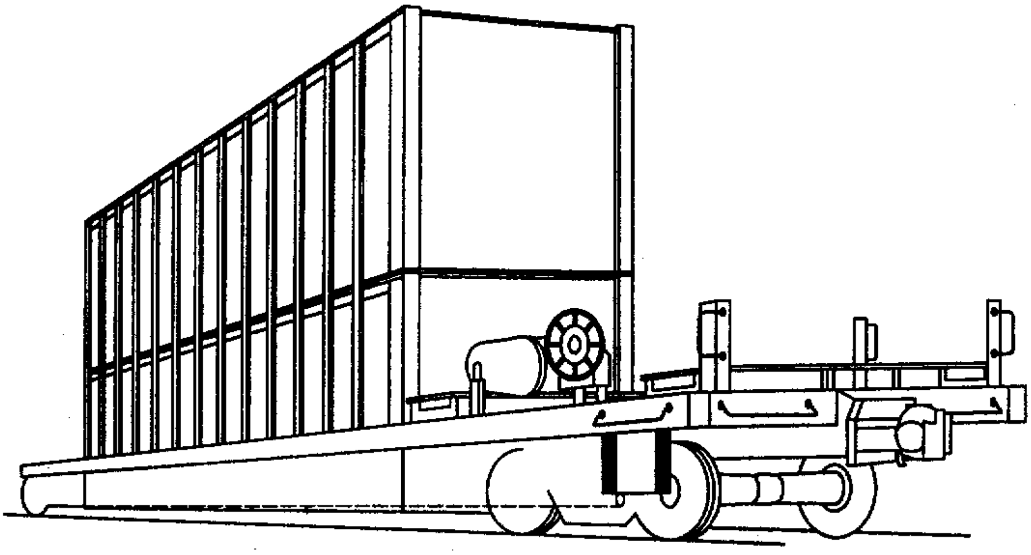
To ensure safe operation on double stack rail car vehicles, both the lower and the upper containers shall be supported by all four bottom ,corner fittings only. The bottom container shall be secured to the rail vehicle through the bottom corner fittings either by twistlocks or other means which will ensure compliance with 9.1. The upper container shall be secured to the lower container through the bottom corner fittings either by twistlocks or other means which will ensure compliance with 9.1. It is noted that these rail cars should always be shoved to rest during operations, i.e. "shunting" should not be allowed. An example of a securing lifting used for transport by rail and of a double stack rail vehicle is shown in Figure 29.

To ensure safe operation:

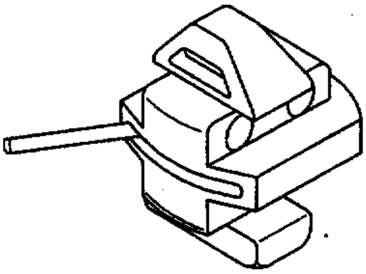
— the position of the securing devices shall be readily apparent;

— before the vehicle is moved, the securement of the container shall be checked;

— before the containers are lifted, all locking devices shall be released.



a) Overall view of a typical double stack rail car



b) Detail of securing fitting

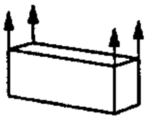
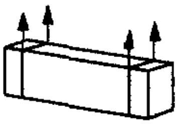
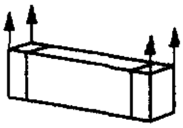
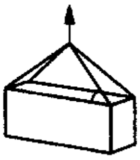
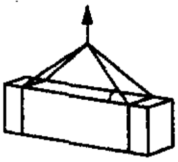
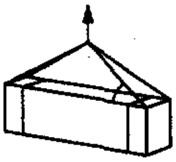
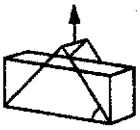
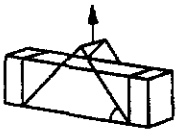
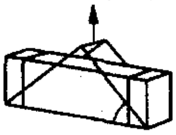
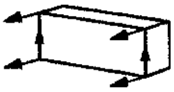
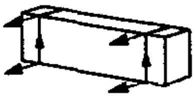
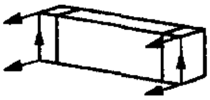
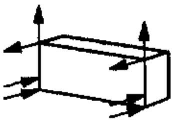
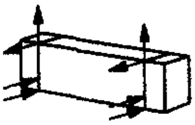
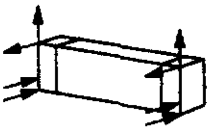
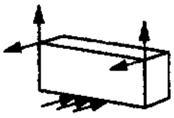
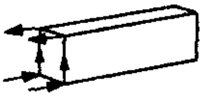
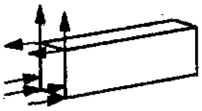
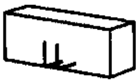
Figure 29 — Example of double stack rail car with securing fittings in common use

AMENDMENT 4: 45 ft containers

Page 5

Replace Table 1 with the following:

Table 1 — Summary of specified lifting methods

Subclause	Description	Container types A, B, C and D	Container type E at 40 ft position	Container type E at 45 ft position
6.2	Top lift spreader			
6.3	Top lift sling			
6.4	Bottom lift sling			
6.5	Side lift: method 1			
6.6	Side lift: method 2			
6.7	Side lift: method 3		Not applicable to type E (45 ft) containers	Not applicable to type E (45 ft) containers
8	End lift: method 1		Not applicable to type E (45 ft) containers	Not applicable to type E (45 ft) containers
6.9	End lift: method 2		Not applicable to type E (45 ft) containers	Not applicable to type E (45 ft) containers
6.10	Fork-lift		Not applicable to type E (45 ft) containers	Not applicable to type E (45 ft) containers

Page 6, Table 2

Replace the existing Table 2 by the following, which includes container types 1EE and 1EEE:

Table 2 — Size designation referred to in Tables 3 to 12

Nominal length		External height			
m	ft	< 2 438 mm (8 ft 0 in)	2 438 mm (8 ft 0 in)	2 591 mm (8 ft 6 in)	2 896 mm (9 ft 6 in)
13,716	45	—	—	1EE	1EEE
12	40	1AX	1A	1AA	1AAA
9	30	1BX	1B	1BB	1BBB
6	20	1CX	1C	1CC	—
3	10	1DX	1D	—	—

NOTE All units have a nominal width of 2 438 mm (8 ft 0 in).

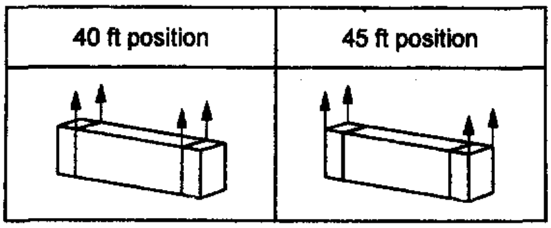
Page 6

6.2 Top lift spreader

Make the existing Figure 2 into Figure 2a) with the caption:

a) Lifting containers other than type E

Add a new part b) to Figure 2:



b) Lifting type E containers

Figure 2 — Lifting by means of a top lift spreader

Replace the existing subclause 6.2.2 by the following:

6.2.2 Lifting devices shall be properly engaged. Gathering devices shall impinge on corner or intermediate fittings only.

Page 7, Table 3

Replace the existing Table 3 by the following, which includes container types EEE and EE.

Table 3 — Applicability of top lift spreaders

Key: ☐ Allowed ▨ Not allowed (or not applicable)

Empty container															Container type		ISO 6346	Loaded container														
EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
					▨				▨			▨		▨	General purpose		GP,VN						▨				▨			▨		▨
															Open top		UT															
															Bulk: non-pressurized/box		BU															
					▨				▨			▨		▨	Thermal		RE,RT RS						▨				▨			▨		▨
															Tank for liquids and gases		TN,RT TG															
															Bulk: non-pressurized/hopper pressurized		BK															
▨	▨	▨	▨	▨		▨	▨	▨		▨	▨		▨		Platform		PL	▨	▨	▨	▨	▨	1)	▨	▨	▨	1)	▨	▨	1)	▨	1)
															Platform -based	complete and fixed ends	PF															
																fixed free-standing posts	PF															
																complete and folding ends, erected condition	PC															
																folding free-standing posts, erected condition	PC															
																complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
																folding free-standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
															Platform-based with complete superstructure and open-sided		PS															

[1] Top lift possible with extensions only.

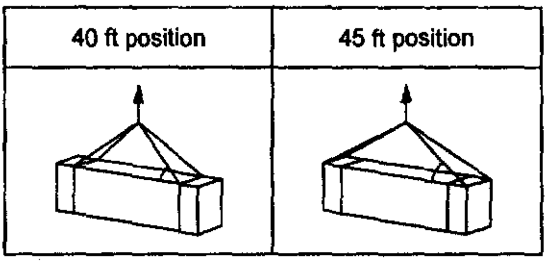
Page 7

6.3 Top lift sling

Make the existing Figure 3 into Figure 3a) with the caption:

a) Lifting containers other than type E

Add a new part b) to Figure 3:



b) Lifting type E containers

Figure 3 — Lifting by means of a top lift sling

Replace the existing subclause 6.3.1 by the following (to include "intermediate"):

> **6.3.1** The container is lifted by all four top corner or intermediate fittings with forces applied other than vertically.

Page 8, Table 4

Replace the existing Table 4 by the following, which includes container types EEE and EE:

Table 4 — Applicability of top slings

Key: ☐ Allowed , ▨ Not allowed (or not applicable)

Empty container															Container type		ISO 6346	Loaded container														
EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
					▨				▨			▨		▨	General purpose		GP,VN	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	▨
															Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)
															Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)
1)	1)	1)	1)	1)	▨	1)	1)	1)	▨	1)	1)	▨	1)	▨	Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	▨
															Tank for liquids and gases		TN,RT TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)
															Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)
▨	▨	▨	▨	▨		▨	▨	▨		▨	▨		▨		Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Platform -based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		fixed free-standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		folding free-standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
																complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
																folding free-standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
															Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		

1) Centre of gravity may be eccentric.

2) For 1D and 1DX containers, the lifting forces shall be applied at an angle not less than 60° to the horizontal, see Figure 4.

NOTE Centre of gravity may be mobile, e.g. liquid, bulk or hanging loads.

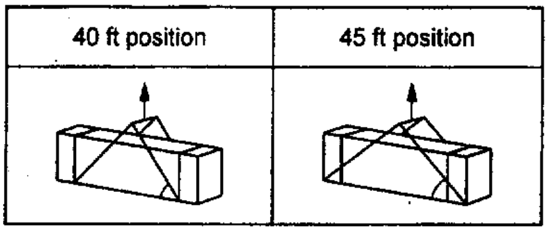
Page 9

6.4 Bottom lift sling

Make the existing Figure 5 into Figure 5a) with the caption:

a) Lifting containers other than type E

Add a new part b) to Figure 5:



b) Lifting type E containers

Figure 5 — Lifting by means of a bottom lift sling

Replace the existing subclause 6.4.1 by the following (to include "intermediate"):

> **6.4.1** The container is lifted from side apertures of four bottom corner or intermediate fittings by means of slings. The bottom sling attachment shall bear on the corner or intermediate fittings only and should be such to exert lifting forces not more than 38 mm away from the outer face of the corner fittings (see Figure 6).

Page 10, Table 5

Replace the existing Table 5 by the following, which includes container types EEE and EE:

Table 5 — Applicability of bottom lift slings

Key: ☐ Allowed ▨ Not allowed (or not applicable)

Empty container															Container type		ISO 6346	Loaded container														
EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
					▨				▨			▨		▨	General purpose		GP,VN						▨				▨			▨		▨
															Open top		UT															
															Bulk: non-pressurized/box		BU	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)
1)	1)	1)	1)	1)	▨	1)	1)	1)	▨	1)	1)	▨	1)	▨	Thermal		RE,RT RS	1) 2)	1) 2)	1) 2)	1) 2)	1) 2)	▨	1) 2)	1) 2)	1) 2)	▨	1) 2)	1) 2)	▨	1) 2)	▨
															Tank for liquids and gases		TN,RT TG															
															Bulk: non-pressurized/hopper pressurized		BK															
▨	▨	▨	▨	▨		▨	▨	▨		▨	▨		▨		Platform		PL	▨	▨	▨	▨	▨		▨	▨	▨		▨	▨		▨	
															Platform-based	complete and fixed ends	PF															
																fixed free-standing posts	PF															
																complete and folding ends, erected condition	PC															
																folding free-standing posts, erected condition	PC															
																complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
																folding free-standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
															Platform-based with complete superstructure and open-sided		PS															

1) Centre of gravity may be eccentric.

2) Centre of gravity may be mobile, e.g. liquid, bulk or hanging load.

Page 10, Table 6

Replace the existing Table 6 by the following, which includes container types 1EEE and 1EE:

Table 6 — Lifting angles for loaded containers

Container size designation	Lifting angle, α, min.
1AAA ; 1AA ; 1A ; 1AX ; 1EEE ; 1EE	30°
1BBB; 1BB; 1B; 1BX	37°
1CC; 1C; 1CX	45°
1D; 1DX	60°

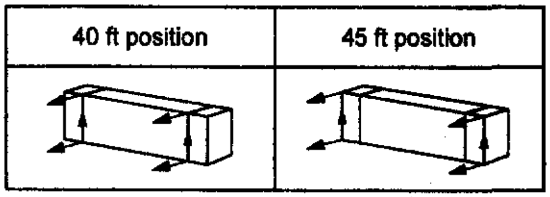
Pages 10 and 11

6.5 Side lift: Method 1

Make the existing Figure 7 into Figure 7a) with the caption:

a) Lifting containers other than type E

Add a new part b) to Figure 7:



b) Lifting type E containers

Figure 7 — Lifting by means of a side lift (method 1)

Replace the existing subclause 6.5.1 by the following (to include "intermediate"):

> **6.5.1** The container is lifted by means of a side lift frame designed to lift a container by the two bottom corner or intermediate fittings of one side and to restrain it by the two top corner or intermediate fittings of the same side.

Page 11, Table 7

Replace the existing Table 7 by the following, which includes container types EEE and EE:

Table 7 — Applicability of side lift (method 1)

Key: ☐ Allowed ▨ Not allowed (or not applicable)

Empty container															Container type		ISO 6346	Loaded container														
EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
					▨				▨			▨		▨	General purpose		GP,VN	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨			▨		▨
															Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
															Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
1)	1)	1)	1)	1)	▨	1)	1)	1)	▨	1)	1)	▨	1)	▨	Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	▨	2)	▨
															Tank for liquids and gases		TN,RT TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
									1						Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
▨	▨	▨	▨	▨		▨	▨	▨		▨	▨		▨		Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
															Platform based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
																fixed free-standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
																complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
																folding free-standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
																complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
																folding free-standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
															Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					

1) Centre of gravity may be eccentric.

2) Centre of gravity may be mobile, e.g. liquid, bulk or hanging load.

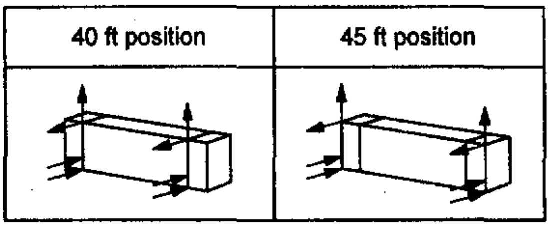
Pages 11 and 12

6.6 Side lift: Method 2

Make the existing Figure 8 into Figure 8a) with the caption:

a) Lifting containers other than type E

Add a new part b) to Figure 8:



b) Lifting type E containers

Figure 8 — Lifting by means of a side lift (method 2)

Replace the existing subclause 6.6.1 by the following (to include "intermediate"):

> **6.6.1** The container is lifted by means of a side lift frame designed to lift a container by the two top corner or intermediate fittings of one side and to take the reaction forces on the bottom corner or intermediate fittings of the same side or on suitable corner post areas above those corner fittings (see Figure 9).

Page 12, Table 8

Replace the existing Table 8 by the following, which includes container types EEE and EE:

Table 8 — Applicability of side lift (method 2)

Key: ☐ Allowed ▨ Not allowed (or not applicable)

Empty container															Container type		ISO 6346	Loaded container														
EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
					▨				▨			▨		▨	General purpose		GP,VN	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨			▨		▨
															Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
															Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
1)	1)	1)	1)	1)	▨	1)	1)	1)	▨	1)	1)	▨	1)	▨	Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	▨	2)	▨
															Tank for liquids and gases		TN,RT TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
															Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
															Platform -based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
																fixed free-standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
																complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
																folding free-standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		folding free-standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
															Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					

1) Centre of gravity may be eccentric.

2) Centre of gravity may be mobile, e.g. liquid, bulk or hanging loads.

NOTE When using this method, care should be taken to ensure that under dynamic conditions the container is not subjected to undue deflection or damage.

Page 13

6.7 Side lift: Method 3

Insert a new paragraph in 6.7.1:

Side lift (method 3) is not allowed for EE and EEE containers.

Page 13, Table 9

Replace the existing Table 9 by the following, which includes container types EEE and EE:

Table 9 — Applicability of side lift (method 3)

Key: ☐ Allowed ▨ Not allowed (or not applicable)

Empty container															Container type		ISO 6346	Loaded container														
EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
▨	▨				▨				▨			▨		▨	General purpose		GP,VN	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨														Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨														Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	1)	1)	1)	▨	1)	1)	1)	▨	1)	1)	▨	1)	▨	Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Tank for liquids and gases		TN,RT TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨														Platform -based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨															fixed free-standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨															complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨															folding free-standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		folding free-standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨														Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨

1) Centre of gravity may be eccentric.

Side lift (method 3) is not allowed for EE and EEE containers.

NOTE The use of piggybackers has never been recognized by ISO and may cause damage due to excessive stresses to containers operated in such a way.

Page 14

6.8 End lift: Method 1

Insert a new paragraph in 6.8.1:

End lift (method 1) is not allowed for EE and EEE containers.

Page 14, Table 10

Replace the existing Table 10 by the following, which includes container types EEE and EE:

Table 10 — Applicability of end lift (method 1)

Key: ☐ Allowed ▨ Not allowed (or not applicable)

Empty container															Container type		ISO 6346	Loaded container														
EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	☐	☐	▨	☐	▨	General purpose		GP,VN	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	☐	☐	▨	☐	▨	Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	☐	☐	▨	☐	▨	Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Tank for liquids and gases		TN,RT TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Platform -based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		fixed free-standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		folding free-standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		folding free-standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	☐	☐	▨	☐	▨	Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨

End lift (method 1) is not allowed for EE and EEE containers.

NOTE When using this method, care should be taken to ensure that under dynamic conditions the container is not subjected to undue deflection or damage.

Pages 14 and 15

6.9 End lift: Method 2

Insert a new paragraph in 6.9.1:

End lift (method 2) is not allowed for EE and EEE containers.

Page 15, Table 11

Replace the existing Table 11 by the following, which includes container types EEE and EE:

Table 11 — Applicability of end lift (method 2)

Key. ☐ Allowed ▨ Not allowed (or not applicable)

Empty container															Container type		ISO 6346	Loaded container														
EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	☐	☐	▨	☐	▨	General purpose		GP,VN	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	☐	☐	▨	☐	▨	Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	☐	☐	▨	☐	▨	Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Tank for liquids and gases		TN,RT TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Platform -based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		fixed free-standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		folding free-standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		folding free-standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	☐	☐	▨	☐	▨	Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨

End lift (method 2) is not allowed for EE and EEE containers.

NOTE When using this method, care should be taken to ensure that under dynamic conditions the container is not subjected to undue deflection or damage.

Pages 15 and 16

6.10 Fork lifts

Insert a new paragraph in 6.10.1:

The use of fork lifts is not allowed for EE and EEE containers.

Page 16, Table 12

Replace the existing Table 12 by the following, which includes container types EEE and EE:

Table 12 — Applicability of fork lifts

Key: ☐ Allowed ▨ Not allowed (or not applicable)

Empty container															Container type		ISO 6346	Loaded container														
EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				EEE	EE	AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨			▨		▨	General purpose		GP,VN	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨			▨		▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨						Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨						Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	1)	1)	▨	1)	▨	Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	▨	2)	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Tank for liquids and gases		TN,RT TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		▨		Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		▨	
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨						Platform -based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨							fixed free-standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨							complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨							folding free-standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨							complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨							folding free-standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨						Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					

1) Centre of gravity may be eccentric.

2) Centre of gravity may be mobile, e.g. liquid, bulk or hanging loads.

Fork lifts are not allowed for EE and EEE containers.

Add the following figure before Annex A:

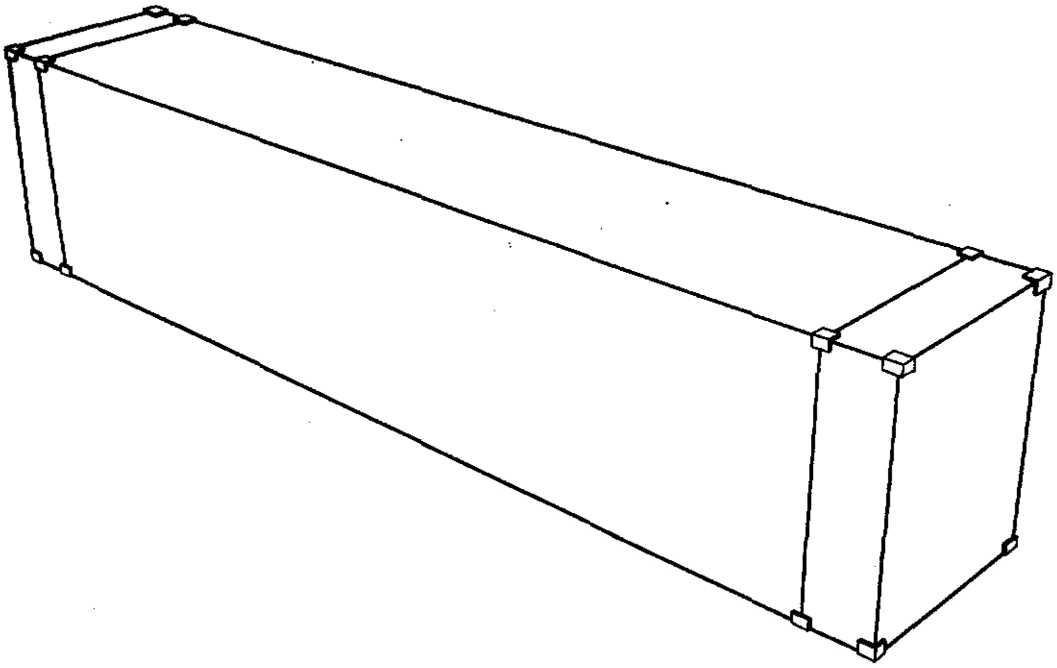


Figure 30 — 45 ft container with corner and intermediate fittings

(TED 12)

Reprography Unit, BIS, New Delhi, India

Indian Standard

SERIES 1 FREIGHT CONTAINERS — HANDLING AND SECURING

(Second Revision)

1 Scope

This International Standard specifies methods of handling and securing series 1 freight containers built and tested to comply with the latest editions of ISO 1496-1 to ISO 1496-5.

NOTE — Freight containers built according to specifications contained in earlier editions of ISO 1496 may not possess the same capabilities.

This International Standard defines basic principles and procedures to ensure safe operation of containers in all surface modes of transport.

Methods of handling and securing are described for both loaded and empty containers. The conditions for lifting different types of loaded and empty containers are laid down in clause 6.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of the publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on the International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 668	1995	*Series 1 freight containers — Classification, dimensions and ratings*
ISO 830	1981	*Freight containers — Terminology*
ISO 830 Amd1	1984	
ISO 830 Amd2	1988	
ISO 1161	1984	*Series 1 freight containers — Corner fittings - Specifications*
ISO 1161 Corr	1990	
ISO 1496-1	1990	*Series 1 freight containers — Specification and testing — Part 1: General cargo containers for general purposes*
ISO 1496-1 Amd1	1993	
ISO 1496-2	1988	*Series 1 freight containers — Specification and testing — Part 2: Thermal containers*
ISO 1496-3	1995	*Series 1 freight containers — Specification and testing — Part 3: Tank containers for liquids, gases and pressurized dry bulk*

ISO 1496-4	1991	*Series 1 freight containers — Specification and testing — Part 4: Non-pressurized containers for dry bulk*
ISO 1496-4 Amd1	1994	
ISO 1496-5	1991	*Series 1 freight containers — Specification and testing — Part 5: Platform and platform-based containers*
ISO 1496-5 Amd1	1993	
ISO 1496-5 Amd2	1994	
ISO 6346	1995	*Freight containers — Coding, identification and marking*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 830 and the following apply.

3.1 empty container

container in the tare condition

3.2 loaded container

container in other than tare condition

3.3 eccentricity of the centre of gravity

longitudinal and/or lateral horizontal differences between the centre of gravity of any container (empty or loaded, with or without fittings and appliances) and the geometric centre of the diagonals of the centres of the four bottom corner fittings

3.4 mobile centre of gravity

centre of gravity of a container loaded with liquid, bulk, hanging or similar cargo which is liable to move under dynamic conditions

3.5 securing device

device used to secure containers

NOTE — They are in direct contact with the corner fittings of the container or between the transportation means and corner fittings of the container.

4 Basic requirements

4.1 General

Users of this International Standard should use caution regarding conditions which may place loads on the containers or on the handling or securing devices. These include deterioration of the container or devices, loosening and over-tightening of devices, slackness of cargo within containers, eccentric loading and excessive environmental conditions such as high wind, ice, wave action, etc.

NOTE — Slackness is a general term which includes shifting of cartons, shifting and settlement of bulk cargoes, liquids having a free surface, etc.

4.1.1 The requirements of all relevant national and international regulations shall be complied with.

4.1.2 The container and any equipment which may be used in its operation shall be adequately maintained.

4.1.3 Doors, lids, closures, removable or foldable parts and any loose equipment shall be properly secured.

4.1.4 All personnel engaged in handling and securing operations shall have received proper instructions, especially with regard to safety matters.

4.1.5 It is necessary to know whether the container is empty or loaded; unless otherwise ascertained, a container shall be treated as loaded.

4.1.6 Strong winds and other environmental conditions can have an effect on handling equipment and additional care shall be taken when operating in such conditions.

4.2 Packing, loading and emptying

4.2.1 When a cargo is packed, loaded, and secured where necessary, this shall be carried out in accordance with good and recommended practices so that the cargo does not impose on the container forces in the excess of those for which it has been designed and so that the fundamental requirements specified in 4.2.2 to 4.2.4 are complied with.

4.2.2 The equipment used for loading and emptying the container shall only impose loads which are not in excess of those for which the container was designed.

4.2.3 The total mass of all items packed and loaded into the container, including dunnage, securing equipment and similar equipment, shall not exceed the maximum permitted payload, i.e. the maximum permissible operating gross mass minus the tare.

4.2.4 The cargo shall be distributed throughout the container to ensure that the centre of gravity is kept as central and as low as possible

- to avoid excessive tilting;

- to avoid overstressing either the container or the handling equipment;

- to avoid unacceptable vehicle axle loading;

- to avoid lack of vehicle stability;

- to avoid unacceptable load concentrations.

Eccentricity of the centre of gravity for the loaded container varies with the distribution of load within the container; designers of containers and handling equipment should take this fact into account. As an example, when 60 % of the load by mass is distributed in 50 % of the container length measured from one end (see figure 1), the eccentricity corresponds to 5 %.

4.3 Stowage and securing of cargo

The cargo shall be stowed and secured to prevent damage which might otherwise result from dynamic conditions encountered during handling and transportation.

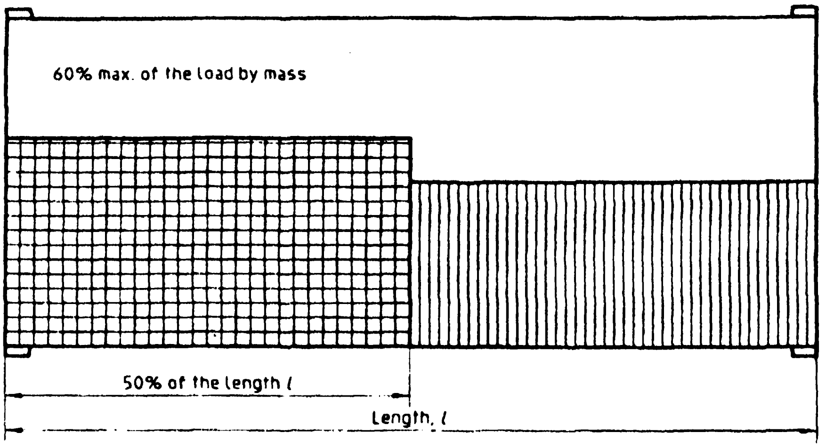


Figure 1 — Load distribution

5 Handling

5.1 Handling by specified lifting methods

5.1.1 Care shall be taken to ensure that the equipment used is suitable for the load and is safely attached to the container and that the container is free to be handled.

5.1.2 In the case of a single-point lift, special attention should be paid to the risk of the container tilting owing to eccentricity of the centre of gravity.

5.1.3 Care shall be taken when lifting a container whose centre of gravity is mobile or eccentric, e.g. a tank container, a bulk container, a container with a liquid bulk bag, a container with hanging cargo or a thermal container with a refrigerating unit (integral or clip-on).

5.2 Handling by unspecified lifting methods

Containers may be handled by methods other than those specified in clause 6 but only after careful evaluation of the equipment by means of which the container is to be handled and of the methods of operation envisaged, with respect to international container standards.

6 Specified lifting methods

6.1 General

6.1.1 The lifting methods specified in 6.2 to 6.10 are summarized in table 1.

6.1.2 The headings "Allowed" and "Not allowed" used in tables 3 to 5 and tables 7 to 12 refer to the specified lifting methods applied to differing types and sizes of containers and take into account the stresses on containers of differing types of design, their loads, where applicable, and the safety of the operation.

NOTE — There could be exceptions in cases when combinations of container types, size, load, design and operating condition could not be taken into account in tables 3 to 5 and tables 7 to 12. Such situations should be carefully evaluated by those competent to do so in order to decide whether a safe and satisfactory operation can be ensured. An explanation of the size designations referred to in tables 3 to 12 is given in table 2.

Table 1 — Summary of specified lifting methods

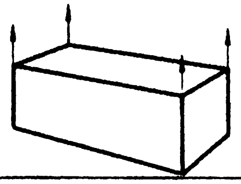
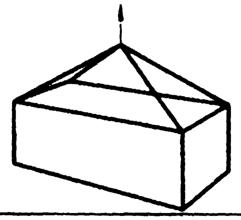
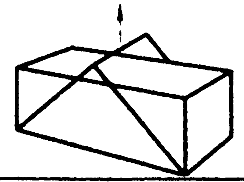
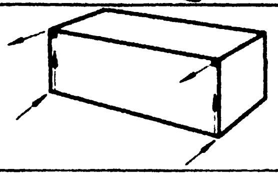
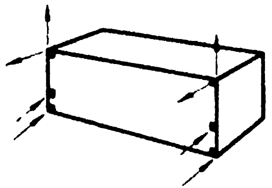
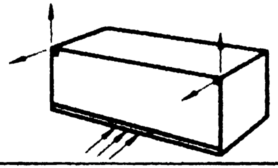
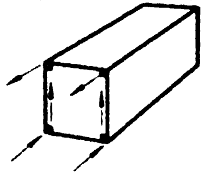
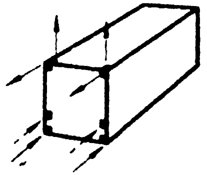
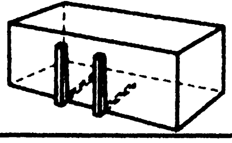
Subclause	Description	Illustration
6.2	Top lift spreader	
6.3	Top lift sling	
6.4	Bottom lift sling	
6.5	Side lift : method 1	
6.6	Side lift : method 2	
6.7	Side lift : method 3	
6.8	End lift : method 1	
6.9	End lift : method 2	
6.10	Fork-lift	

Table 2 — Size designations referred to in tables 3 to 12

Nominal length		External height			
m	ft	< 2 438 mm (8 ft 0 in)	2 438 mm (8 ft 0 in)	2 591 mm (8 ft 6 in)	2 896 mm (9 ft 6 in)
12	40	1AX	1A	1AA	1AAA
9	30	1BX	1B	1BB	1BBB
6	20	1CX	1C	1CC	-
3	10	1DX	1D	-	-
NOTE — All units have a nominal width of 2 438 mm (8 ft 0 in).					

6.2 Top lift spreaders

See figure 2.

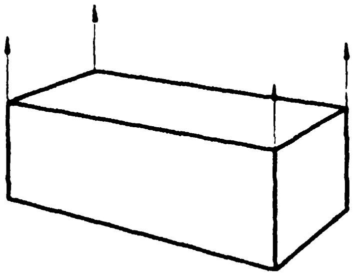


Figure 2 — Lifting by means of a top lift spreader

6.2.1 The container is lifted by means of a spreader designed to lift containers by the top apertures of the four top corner fittings, the lifting forces being applied vertically.

6.2.2 Lifting devices shall be properly engaged. Gathering devices shall impinge on corner fittings only.

6.2.3 The applicability of top lift spreaders is given in table 3.

6.2.4 Folding platform-based containers (codes PL and PC; see ISO 6346), when empty and in the folded condition, may be handled in interlocked piles. The total mass of the pile shall not exceed the maximum gross mass (rating) according to ISO 668.

Table 3 — Applicability of top lift spreaders

Key : ☐ Allowed ▨ Not allowed (or not applicable)

Empty container													Container type		ISO 6346	Loaded container												
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
			▨				▨			▨		▨	General purpose		GP,VH				▨				▨			▨		▨
													Open top		UT													
													Bulk: non-pressurized/box		BU													
			▨				▨			▨		▨	Thermal		RE,RT RS				▨				▨			▨		▨
													Tank for liquids and gases		TN,TD TG													
													Bulk: non-pressurized/hopper pressurized		BK													
▨	▨	▨		▨	▨	▨		▨	▨		▨		Platform		PL	▨	▨	▨	1)	▨	▨	▨	1)	▨	▨	1)	▨	1)
													Platform-based	complete and fixed ends	PF													
														fixed free standing posts	PF													
														complete and folding ends, erected condition	PC													
														folding free standing posts, erected condition	PC													
														complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
														folding free standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
													Platform-based with complete superstructure and open-sided		PS													

1) Top lift possible with extensions only.

6.3 Top lift sling

See figure 3.

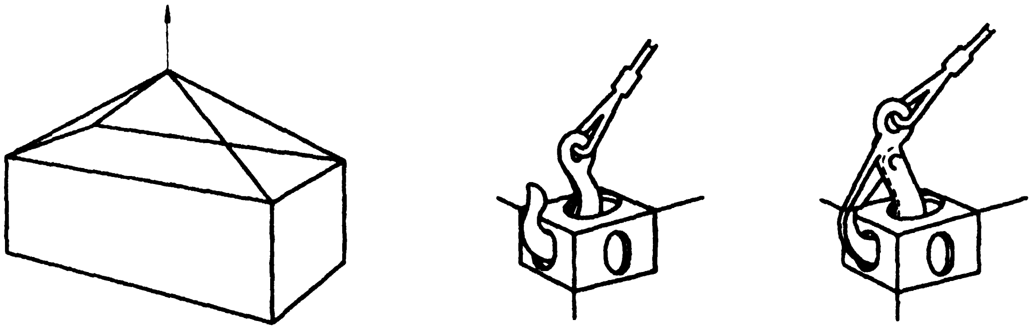


Figure 3 — Lifting by means of a top lift sling

6.3.1 The container is lifted by all four top corner fittings with forces applied other than vertically.

6.3.2 Lifting devices shall be properly engaged. Hooks shall always be placed in an inward to outward direction.

6.3.3 The applicability of top lift slings is given in table 4.

6.3.4 Folding platform-based containers (codes PL and PC; see ISO 6346), when empty and in the folded condition, may be handled in interlocked piles. The total mass of the pile shall not exceed the maximum gross mass (rating) according to ISO 668.

Table 4 — Applicability of top slings

Key : ☐ Allowed ▨ Not allowed (or not applicable)

Empty container													Container type		ISO 6346	Loaded container												
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
													General purpose		GP,VH	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	▨
													Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)
													Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)
1)	1)	1)		1)	1)	1)		1)	1)		1)		Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	▨
													Tank for liquids and gases		TN,TD TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)
													Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)
▨	▨												Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	
▨	▨												Platform-based	complete and fixed ends	PF				▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨													fixed free standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
														complete and folding ends, erected condition	PC					▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨													folding free standing posts, erected condition	PC					▨	▨	▨	▨	▨	▨	▨	▨	▨
														complete and folding ends, folded condition	PC					▨	▨	▨	▨	▨	▨	▨	▨	▨
														folding free standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
													Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		

1) Centre of gravity may be eccentric.

2) For 1D and 1DX containers, the lifting forces shall be applied at an angle not less than 60° to the horizontal, see figure 4.

NOTE — Centre of gravity may be mobile, e.g. liquid, bulk or hanging loads.

Dimensions in metres

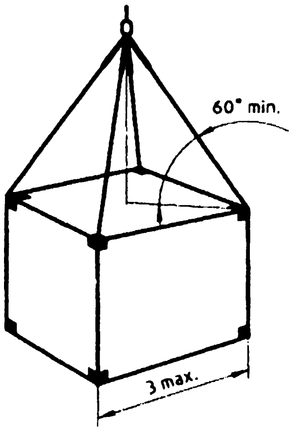


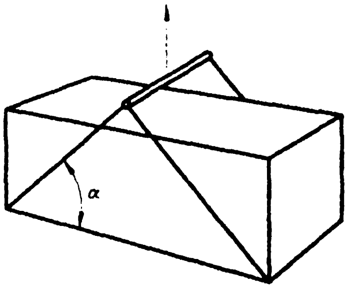
Figure 4 — Application of lifting forces (1D and 1DX containers)

6.4 Bottom lift sling

See figure 5.

6.4.1 The container is lifted from side apertures of four bottom corner fittings by means of slings. The bottom sling attachment shall bear on the corner fittings only and should be such to exert lifting forces not more than 38 mm away from the outer face of the corner fittings (see figure 6).

6.4.2 Lifting devices shall be properly engaged.



NOTE — See footnotes to table 5.

Figure 5 — Lifting by means of a bottom lift sling

Dimensions in millimetres

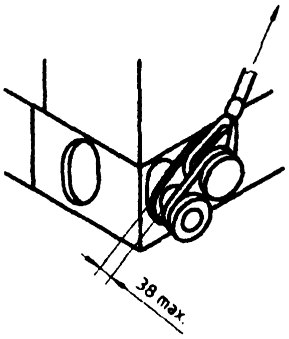


Figure 6 — Bottom sling attachment

6.4.3 The applicability of bottom lift slings is given in table 5.

6.4.4 Folding platform-based containers (codes PL and PC; see ISO 6346), when empty and in the folded condition, may be handled in interlocked piles. The total mass of the pile shall not exceed the maximum gross mass (rating) according to ISO 668.

6.4.5 For loaded containers, the lifting angle, α, shown in figure 5, shall not be less than the minimum values shown in table 6.

Table 5 — Applicability of bottom lift slings

Key : ☐ Allowed ▨ Not allowed (or not applicable)

Empty container													Container type		ISO 6346	Loaded container												
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
			▨				▨			▨		▨	General purpose		GP,VH											▨		▨
													Open top		UT													
													Bulk: non-pressurized/box		BU	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)
1)	1)	1)	▨	1)	1)	1)	▨	1)	1)	▨	1)	▨	Thermal		RE,RT RS	1) 2)	1) 2)	1) 2)	▨	1) 2)	1) 2)	1) 2)	▨		1) 2)	▨	1) 2)	▨
													Tank for liquids and gases		TN,TD TG	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)
													Bulk: non-pressurized/hopper pressurized		BK	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)
▨	▨	▨		▨	▨	▨		▨	▨		▨		Platform		PL	▨	▨	▨		▨	▨	▨		▨	▨		▨	
													Platform -based	complete and fixed ends	PF													
														fixed free standing posts	PF													
														complete and folding ends, erected condition	PC													
														folding free standing posts, erected condition	PC													
														complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
														folding free standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
													Platform-based with complete superstructure and open-sided		PS													

1) Centre of gravity may be eccentric.
2) Centre of gravity may be mobile, e.g. liquid, bulk or hanging load.

Table 6 — Lifting angles for loaded containers

Container size designation	Lifting angle, α, min.
1AAA ; 1AA ; 1A ; 1AX	30°
1BBB ; 1BB ; 1B ; 1BX	37°
1CC ; 1C ; 1CX	45°
1D ; 1DX	60°

6.5 Side lift: Method 1

See figure 7.

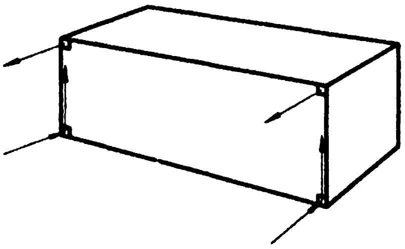


Figure 7 — Lifting by means of a side lift (method 1)

6.5.1 The container is lifted by means of a side lift frame designed to lift a container by the two bottom corner fittings of one side and to restrain it by the two top corner fittings of the same side.

6.5.2 Lifting and restraining devices shall be properly engaged.

6.5.3 The applicability of side lift (method 1) is given in table 7.

Table 7 — Applicability of side lift (method 1)

Key : ☐ Allowed ▨ Not allowed (or not applicable)

Empty container													Container type		ISO 6346	Loaded container												
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
			▨				▨			▨		▨	General purpose		GP,VH	▨	▨	▨	▨	▨	▨	▨	▨			▨		▨
													Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨					
													Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
1)	1)	1)	▨	1)	1)	1)	▨	1)	1)	▨	1)	▨	Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	▨	2)	▨
													Tank for liquids and gases		TN,TD TG	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
													Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
													Platform -based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨					
														fixed free standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
														complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨					
														folding free standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		folding free standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
													Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨					

1) Centre of gravity may be eccentric.
2) Centre of gravity may be mobile, e.g. liquid, bulk or hanging loads.

6.6 Side lift: Method 2

See figure 8.

6.6.1 The container is lifted by means of a side lift frame designed to lift a container by the two top corner fittings of one side and to take the reaction forces on the bottom corner fittings of the same side or on suitable corner post areas above those corner fittings (see figure 9).

6.6.2 Lifting devices shall be properly engaged.

6.6.3 The applicability of side lift (method 2) is given in table 8.

Table 8 — Applicability of side lift (method 2)

Key : ☐ Allowed ☐ Not allowed (or not applicable)

Empty container													Container type		ISO 6346	Loaded container												
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
													General purpose		GP,VH													
													Open top		UT													
													Bulk: non-pressurized/box		BU									2)	2)	2)	2)	2)
1)	1)	1)		1)	1)	1)		1)	1)		1)		Thermal		RE,RT RS									2)	2)		2)	
													Tank for liquids and gases		TN,TD TG									2)	2)	2)	2)	2)
													Bulk: non-pressurized/hopper pressurized		BK									2)	2)	2)	2)	2)
													Platform		PL													
													Platform -based	complete and fixed ends	PF													
														fixed free standing posts	PF													
														complete and folding ends, erected condition	PC													
														folding free standing posts, erected condition	PC													
														complete and folding ends, folded condition	PC													
														folding free standing posts, folded condition	PC													
													Platform-based with complete superstructure and open-sided		PS													

1) Centre of gravity may be eccentric.
2) Centre of gravity may be mobile, e.g. liquid, bulk or hanging loads.

NOTE — When using this method, care should be taken to ensure that under dynamic conditions the container is not subjected to undue deflection or damage.

Dimensions in millimetres

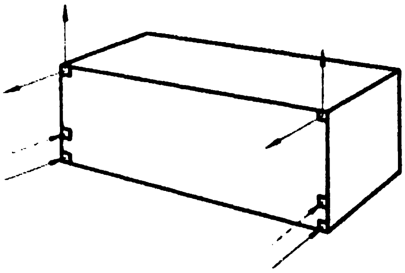
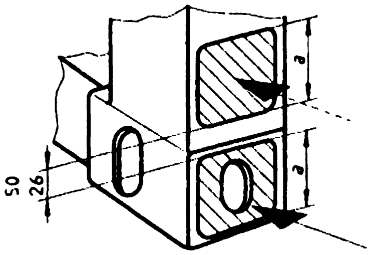


Figure 8 — Lifting by means of side lift (method 2)



NOTE — Dimension *a* is shown to indicate that the two bearing areas shall have similar or equal heights

Figure 9 — Arrangement of bottom corner fittings and corner post areas

6.7 Side lift: Method 3

See figure 10.

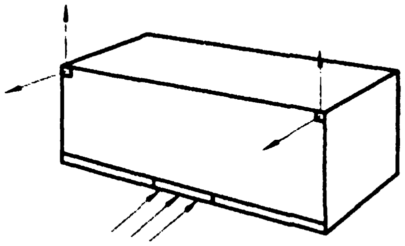


Figure 10 — Lifting by means of side lift (method 3)

6.7.1 The container is lifted by means of a side lift frame designed to lift a container by the two top corner fittings of one side and to take the reaction forces at the bottom side rail of the same side by means of a pad of sufficient size and located so as to prevent deformation and damage to the container.

WARNING 1: Under no circumstances shall the bearing pad be applied to the underside of the container side panel.

WARNING 2: Under no circumstances shall the lifting forces be applied to the underside of the bottom side rail.

6.7.2 Lifting devices shall be properly engaged.

6.7.3 The applicability of side lift (method 3) is given in table 9.

Table 9 — Applicability of side lift (method 3)

Key : ☐ Allowed ▨ Not allowed (or not applicable)

Empty container													Container type		ISO 6346	Loaded container												
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
													General purpose		GP,VH	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
													Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
													Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
1)	1)	1)		1)	1)	1)		1)	1)	▨	1)	▨	Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨	Tank for liquids and gases		TN,TD TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨	Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨	Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
													Platform -based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
														fixed free standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
														complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
														folding free standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨		complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨		folding free standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
													Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
1) Centre of gravity may be eccentric.																												

NOTE — The use of piggybackers has never been recognized by ISO and may cause damage due to excessive stresses to containers operated in such a way.

6.8 End lift: Method 1

See figure 11.

6.8.1 The container is lifted by means of an end lift frame designed to lift a container by the two bottom corner fittings of one end and to restrain it by the two top corner fittings of the same end.

6.8.2 Lifting and restraining devices shall be properly engaged.

6.8.3 The applicability of end lift (method 1) is given in table 10.

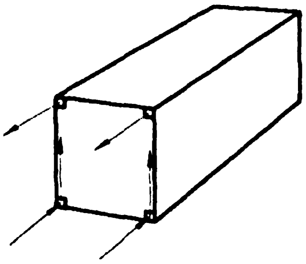


Figure 11 — Lifting by means of an end lift (method 1)

Table 10 — Applicability of end lift (method 1)

Key : ☐ Allowed ☐ Not allowed (or not applicable)

Empty container													Container type		ISO 6346	Loaded container												
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
													General purpose		GP,VH													
													Open top		UT													
													Bulk: non-pressurized/box		BU													
													Thermal		RE,RT RS													
													Tank for liquids and gases		TN,TD TG													
													Bulk: non-pressurized/hopper pressurized		BK													
													Platform		PL													
													Platform -based	complete and fixed ends	PF													
														fixed free standing posts	PF													
														complete and folding ends, erected condition	PC													
														folding free standing posts, erected condition	PC													
														complete and folding ends, folded condition	PC													
														folding free standing posts, folded condition	PC													
													Platform-based with complete superstructure and open-sided		PS													

NOTE — When using this method, care should be taken to ensure that under dynamic conditions the container is not subjected to undue deflection or damage.

6.9 End lift: Method 2

See figure12.

6.9.1 The container is lifted by means of an end lift frame designed to lift a container by the two top corner fittings of one end and to take the reaction forces on the bottom corner fittings of the same end or on suitable corner post areas above those corner fittings (see figure 13).

6.9.2 Lifting devices shall be properly engaged.

6.9.3 The applicability of end lift (method 2) is given in table 11.

Dimensions in millimetres

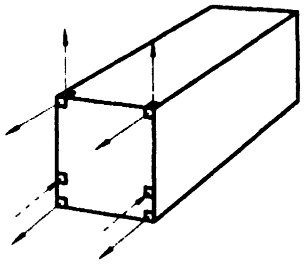
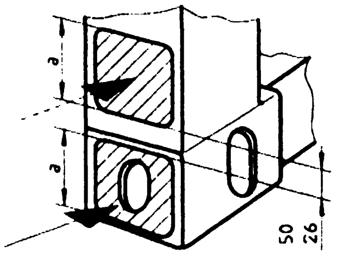


Figure 12 — Lifting by means of an end lift (method 2)



NOTE — Dimension *a* is shown to indicate that the two bearing areas shall have similar or equal heights.

Figure 13 — Arrangement of bottom corner fittings and corner post areas

Table 11 — Applicability of end lift (method 2)

Key: ☐ Allowed ▨ Not allowed (or not applicable)

Empty container													Container type		ISO 6346	Loaded container												
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
										▨		▨	General purpose		GP,VH	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
										▨		▨	Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
										▨		▨	Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
									▨	▨	▨	▨	Thermal		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
									▨	▨	▨	▨	Tank for liquids and gases		TN,TD TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨	Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨	Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨	Platform -based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨		fixed free standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨		complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨		folding free standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨		complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
								▨	▨	▨	▨	▨		folding free standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
										▨		▨	Platform-based with complete superstructure and open-sided		PS	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨

NOTE — When using this method, care should be taken to ensure that under dynamic conditions the container is not subjected to undue deflection or damage.

6.10 Fork lifts

See figure 14.

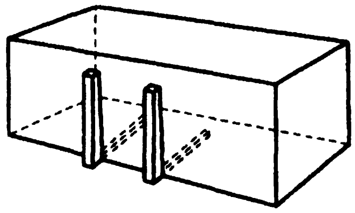


Figure 14 — Lifting by means of forks

6.10.1 The container, if provided with fork-lift pockets as specified in ISO 1496-1, is lifted by means of forks.

WARNING: Under no circumstances shall containers with or without fork-lift pockets be lifted by forks under the base.

6.10.2 Forks should ideally extend the whole width of the container, but under no circumstances should they extend less than 1825 mm into the fork-lift pockets.

When 1CC, 1C and 1CX containers are fitted with a second (inner) set of fork-lift pockets, these pockets shall be used for empty handling only.

6.10.3 The applicability of fork lifts is given in table 12.

Table 12 — Applicability of fork lifts

Key: ☐ Allowed ▨ Not allowed (or not applicable)

Empty container													Container type		ISO 6346	Loaded container												
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX				AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
▨	▨	▨	▨	▨	▨	▨	▨						General purpose		GP,VH	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨						Open top		UT	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨						Bulk: non-pressurized/box		BU	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	2)	2)	2)
▨	▨	▨	▨	▨	▨	▨	▨	1)	1)	▨	1)	▨	*Thermal*		RE,RT RS	▨	▨	▨	▨	▨	▨	▨	▨	2)	2)	▨	2)	▨
▨	▨	▨	▨	▨	▨	▨	▨		▨	▨	▨	▨	Tank for liquids and gases		TN,TD TG	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	Bulk: non-pressurized/hopper pressurized		BK	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		▨		Platform		PL	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		▨	
▨	▨	▨	▨	▨	▨	▨	▨						Platform -based	complete and fixed ends	PF	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨							fixed free standing posts	PF	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨							complete and folding ends, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨							folding free standing posts, erected condition	PC	▨	▨	▨	▨	▨	▨	▨	▨					
▨	▨	▨	▨	▨	▨	▨	▨							complete and folding ends, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨							folding free standing posts, folded condition	PC	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
▨	▨	▨	▨	▨	▨	▨	▨						Platform-based with complete superstructure and open-sided		PF	▨	▨	▨	▨	▨	▨	▨	▨					

1) Centre of gravity may be eccentric.
2) Centre of gravity may be mobile, e.g. liquid, bulk or hanging loads.

7 Landing and supporting

7.1 To avoid damage,containers shall be landed carefully.

Containers shall not be dragged or pushed over any surface.

7.2 On the ground, a firm, flat, drained surface shall be provided, clear of obstructions and projections. On the ground, containers shall be supported by their four bottom corner fittings only.

7.3 On carrying vehicles, containers shall be supported by their corner fittings only, or by the intermediate load transferring areas in the base structure only.

8 Stacking on the ground

8.1 When stacking containers, adequate contact between the top and bottom corner fittings should be ensured.

8.2 Special consideration should be given to the wind conditions which might lead to sliding and tipping of containers; larger and empty containers are more likely to be affected by wind. The critical wind speed is lower for multiple rows than for a single row (stack). Wind effects can be reduced by

- limiting the stacking height;
- block stowage;
- securing of containers to the ground;
- block stowage with loaded containers in the uppermost tier;
- use of stacking fittings or lashings, in particular in exposed rows.

Containers should be stacked so that the longitudinal axis is in line with the predominant wind direction. In the case of a storm warning, the containers at the corners of the block should be secured. The need for such countermeasures should be considered at wind speeds in excess of 15 m/s [1].

For a block of multiple rows of similar containers and for a given wind speed, displacement is likely to occur in the sequence shown in figure 15.

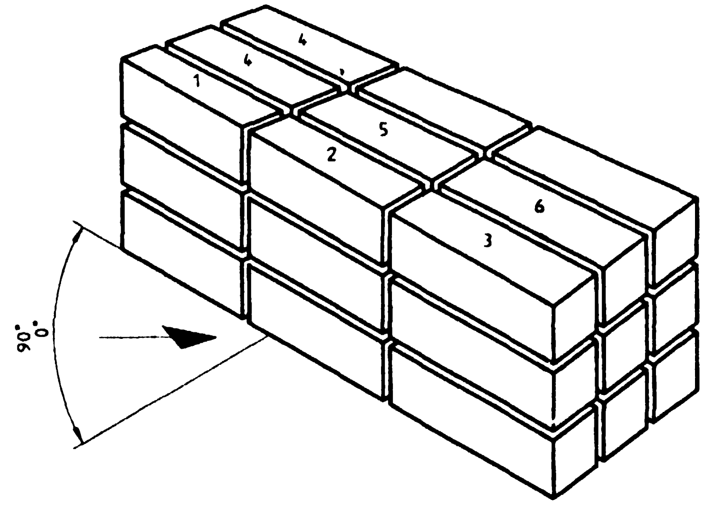


Figure 15 — Wind effects on block stowage of containers

9 Securing during transport

9.1 General

9.1.1 In order to prevent any movement of containers relative to the ship or the carrying vehicle, which might lead to injury to personnel or damage, the containers shall be secured during transport, except as envisaged in 9.3.2.

---

[1] 15 m/s = 29 knot = Beaufort 7.

9.1.2 Containers should be restrained from horizontal movement by their bottom fittings as the main strength of a container is derived through its bottom frame.

9.1.3 Methods used for securing containers to a vehicle or ship should ensure that the strength of containers and their ability to withstand securing forces applied are not exceeded.

9.1.4 The correct positioning of all securing devices should be checked before placing containers onto or removing them from ships or carrying vehicles.

9.1.5 The correct application of such devices should be checked before and during transport.

9.2 Securing on board a ship

9.2.1 Forces on board a ship

On board a ship at sea, containers are subjected to forces arising from ship motion, wind and boarding seas (see figure 17).

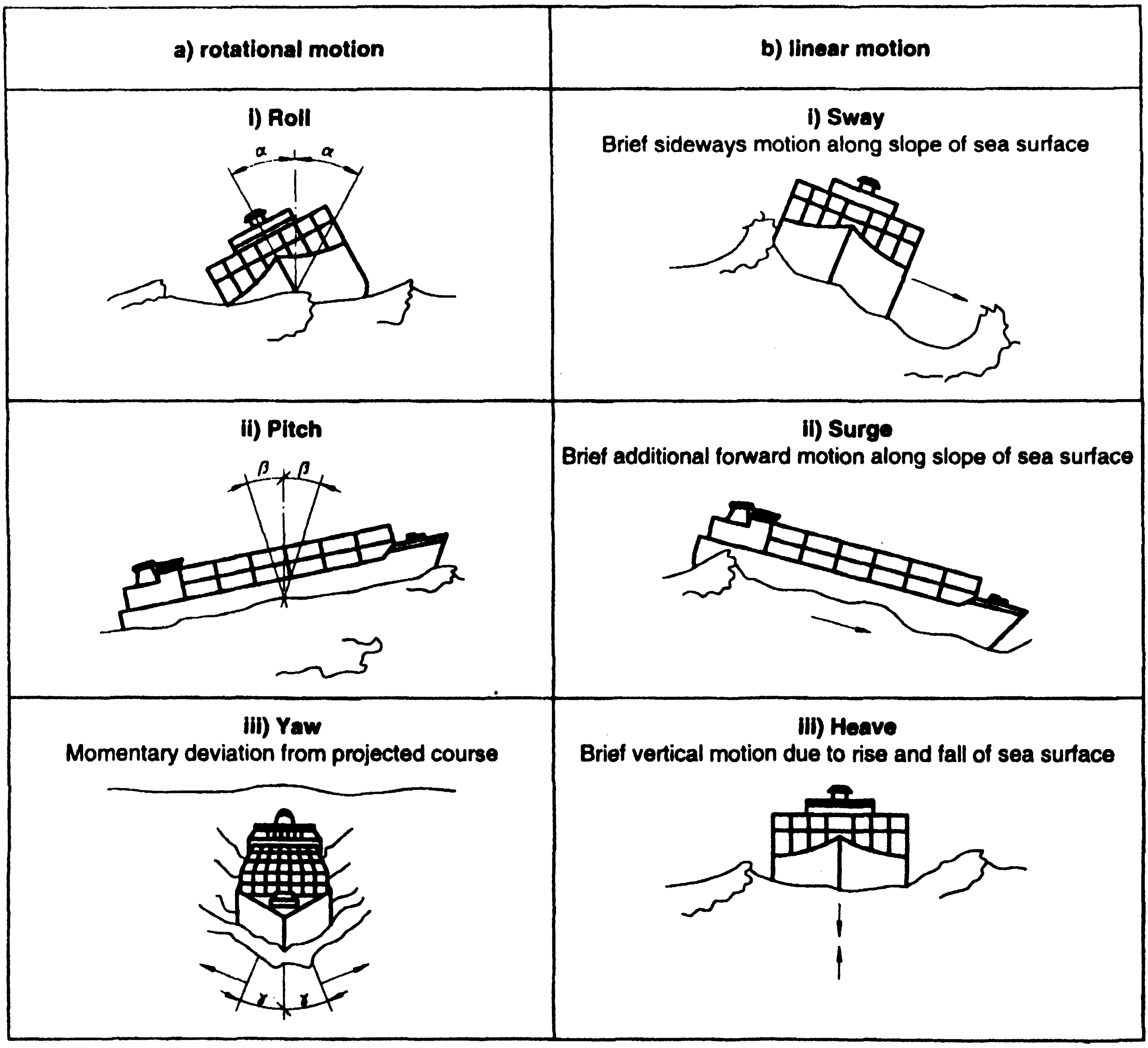

a) rotational motion
b) linear motion
i) Roll
α
α
i) Sway
Brief sideways motion along slope of sea surface
ii) Pitch
β
β
ii) Surge
Brief additional forward motion along slope of sea surface
iii) Yaw
Momentary deviation from projected course
γ
γ
iii) Heave
Brief vertical motion due to rise and fall of sea surface

Figure 16 — Examples of motions of a ship at sea

9.2.2 Effects on container

9.2.2.1 Racking

Racking is the deformation of the container end or side frames as a result of transverse component static and dynamic forces applied to it.

The principal racking force arises when a stack of containers is subjected to rolling which results in transverse forces being borne by the lower containers in the stack; wind can add to these forces.

Should the forces anticipated from this cause exceed the container racking strength, the affected containers shall be given support; this is usually only necessary with transverse racking (see figure 17).

9.2.2.2 Tipping

Tipping is the tendency for a container or stack to pivot on a bottom edge when subjected to a transverse force such as by rolling or wind; a vertical securing element is required to resist it (see figure 17).

9.2.2.3 Sliding

Sliding is the horizontal movement of a container relative to its bearing surface; it can be prevented by the use of positioning fittings, although small movements within their tolerances may still occur (see figure 17).

9.2.2.4 Collapse

Collapse is the failure of a corner post resulting from excessive compressive load; the force applied by securing devices may increase compression load (see figure 18).

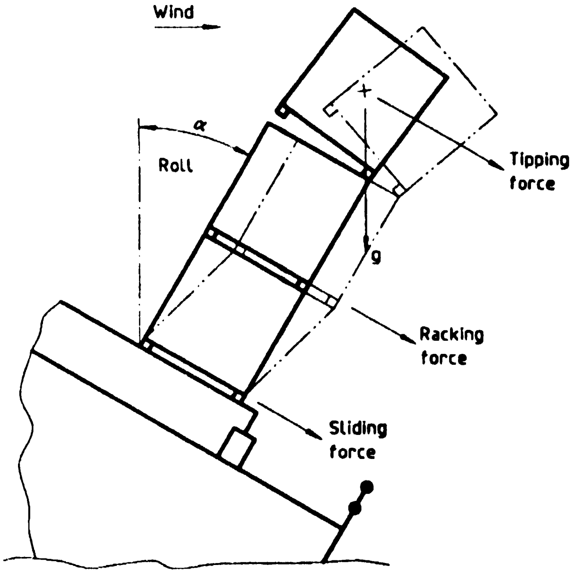


Figure 17 — Racking, tipping and sliding

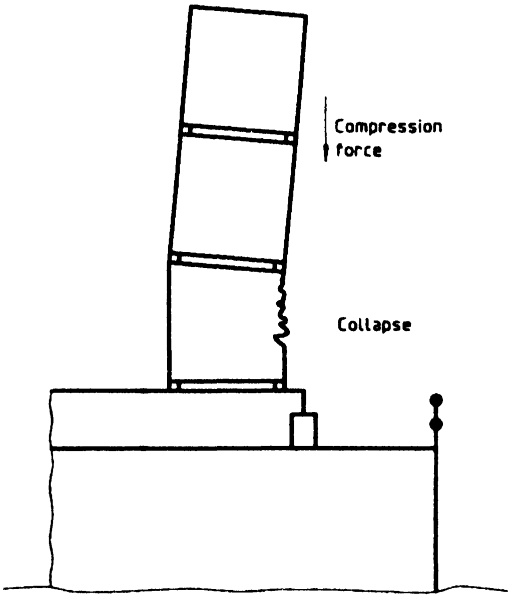


Figure 18 — Compression and collapse

9.2.2.5 Structural failure

Structural failure is the separation or permanent deformation of the structural components of a container due to excessive force. It can be caused by improper use of securing devices or excess compression force, or loose cargo.

9.2.3 Ship design, stowage and securing of containers

9.2.3.1 Ships intended to carry containers are provided with structures, and fixed and portable fittings for use below and/or above deck, which, when properly used in conjunction with planned stowage, take the factors described in 9.2.1 and 9.2.2 into consideration.

9.2.3.2 A cellular container ship is fitted with vertical guides designed to position and hold containers in vertical stacks below and sometimes above deck. For examples of on-deck cell guides, see figure 19.

NOTE 1: A cell is the space occupied by one container when stowed within the a.m. vertical guide.

NOTE 2: Stowage of 20 ft containers in 40 ft cell guides may cause damage due to unacceptable relevant eccentricities.

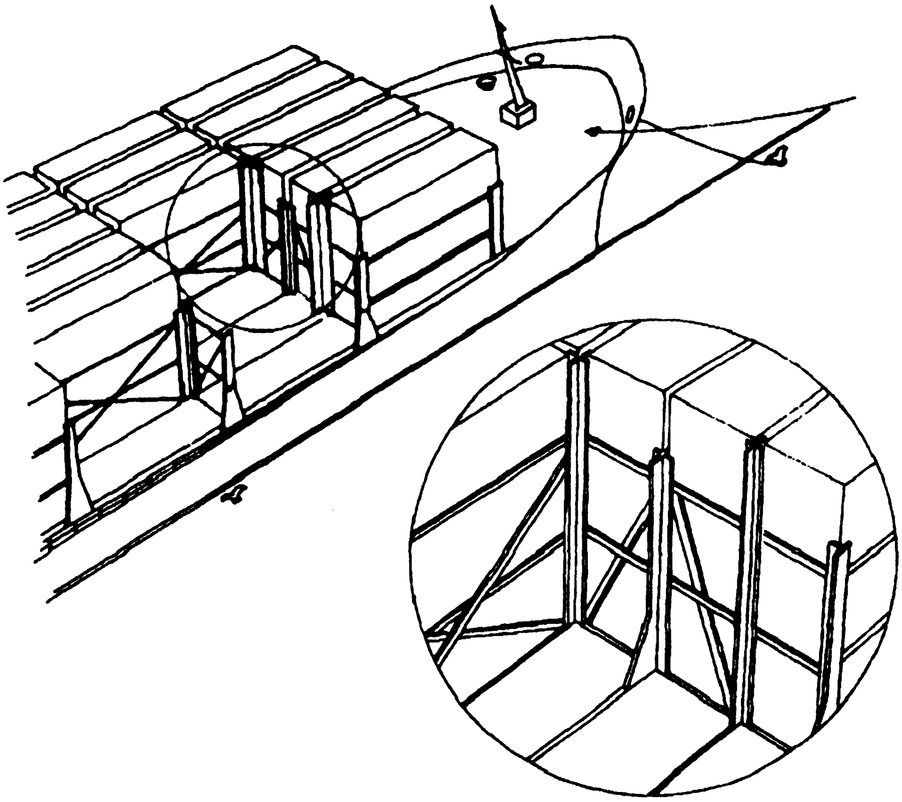


Figure 19 — Example of on-deck cell guides

9.2.3.3 Arrangements to secure containers on deck are based on either of the following two concepts:

- providing restraint of sufficient strength to secure all containers when loaded to their permitted gross mass without exceeding the container strength; or

- providing securing equipment of a certain strength and then selecting and stowing containers, the resulting mass of which does not induce forces exceeding the nominal strength of the containers and or the securing devices.

9.2.3.4 The methods for securing containers below deck in non-cellular container ships are similar to those defined in 9.2.3.3 for use on deck, particularly those to prevent sliding.

9.2.4 Types of securing and lashing equipment

9.2.4.1 General

For examples of container-carrying ships, see figure 20.

When cellular guides are not provided, various basic types of equipment are used such as

- buttresses;
- deck sockets (see figure 21 and figure 22);
- rods and tensioning devices, e.g. turnbuckles (see figure 21 and figure 22);
- chain and wire and tensioning devices, e.g. turnbuckles (see figure 21 and figure 22);
- twistlocks (see figure 21 and figure 22);
- pinlocks (see figure 21 and figure 22).

Combinations of these are frequently used.

NOTE — Function, dimensions, strength requirements and testing of securing and lashing equipment will be described in future amendments.

9.2.4.2 Buttresses

Buttresses are permanent structures rising above the deck of the ship. At appropriate heights, frames can be slotted to secure a tier of containers, and to provide a bed for the subsequent tier.

9.2.4.3 Rods

Rods are used both to hold containers down against tipping and/or to provide support against racking forces. (See figure 21 and figure 22.)

They are used in conjuction with a suitable variety of stacking cones, which both locate containers and secure them against sliding. Elasticity of rods is low and the correct tension should be applied to avoid over-tensioning and possible structural failure of the container, the fittings or the attachment points on the vehicle or ship. (See figure 21 and figure 22.)

9.2.4.4 Chains and wires

Lashing chains and wires are used like rods but only for relatively low stack weights or for single-tier stowage because of their relatively low allowable working loads.

9.2.4.5 Twistlocks

Twistlocks locate and secure containers to each other, within a stack, or to the transport mode. They act through the corner fittings. (See figure 21 and figure 22).

It is important to be able to identify on a twistlock, even in poor visibility, which is the correct way up or whether or not it is locked. All twistlocks in use on board a ship shall lock by turning in the same direction.

9.2.4.6 Pinlocks

Pinlocks locate and secure containers to the deck or each other, hence they act against sliding and tipping. They provide no support against racking forces. They should only be used for more than one tier when selection and stowage of containers ensure that the racking strength of the lower container will not be exceeded. They can be used in combination with other securing systems, i.e. rods or wires. (See figure 21 and figure 22.)

9.2.4.7 Stacking cones

Single- or double-stacking cones are used to ensure that containers are located and restrained from sliding in the horizontal plane. (See figure 21 and figure 22.)

9.2.4.8 Bridge fittings

Bridge fittings are designed to hold adjacent containers together by the upper corner fittings. (See figure 21 and figure 22.)

9.2.4.9 Tensioning devices

Varying tensioning devices used include

- turnbuckles;
- hydraulic or pneumatic devices;
- overcentre tensioners;
- lever arms;
- lever hooks and chains.

Turnbuckles are usually necessary to provide sufficient strength to support containers fully against racking forces. (See figure 21 and figure 22).

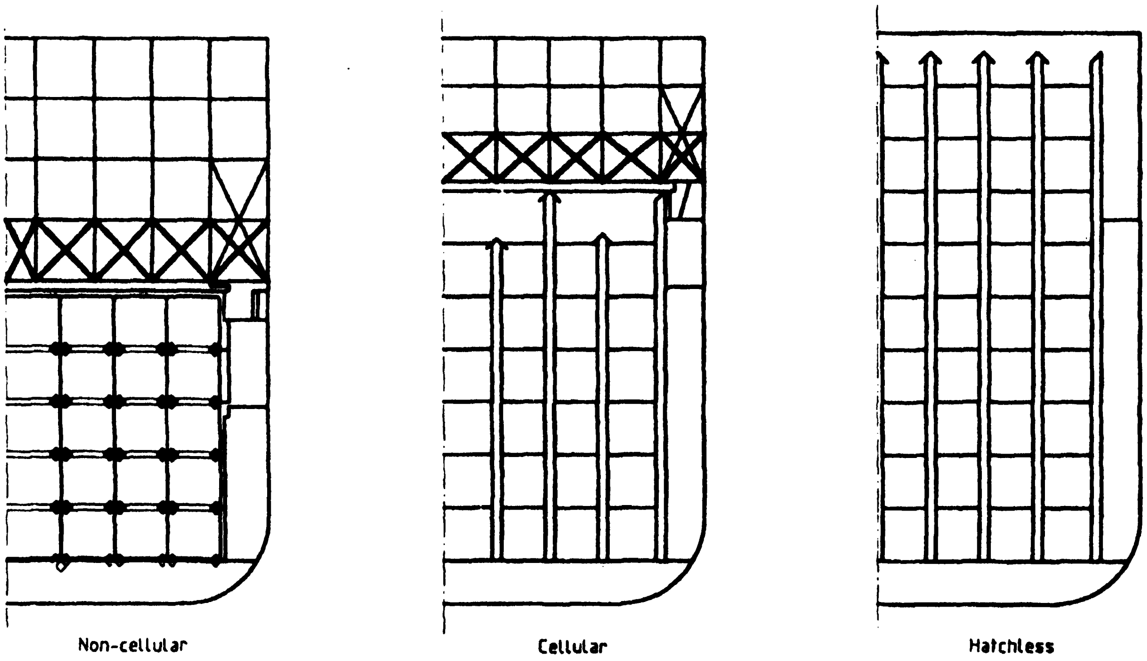


Figure 20 — Examples of container-carrying ships

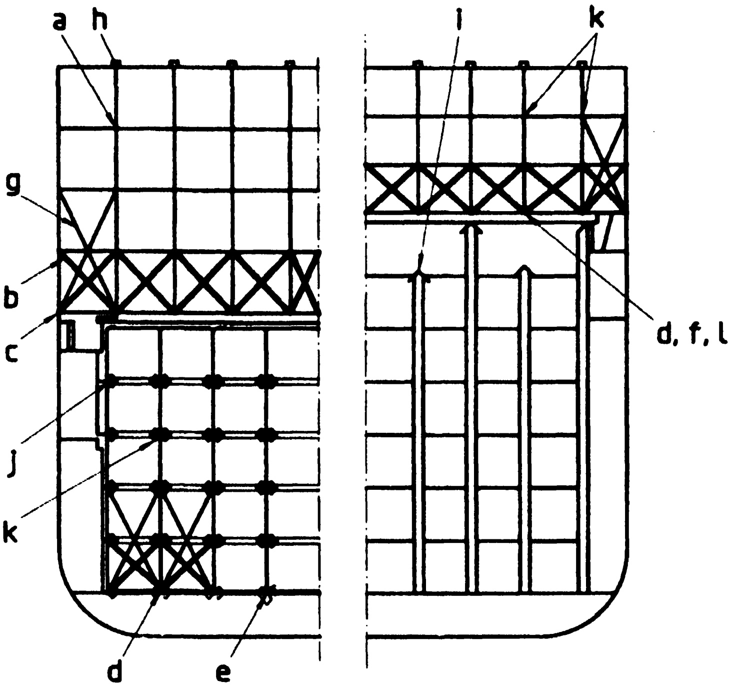
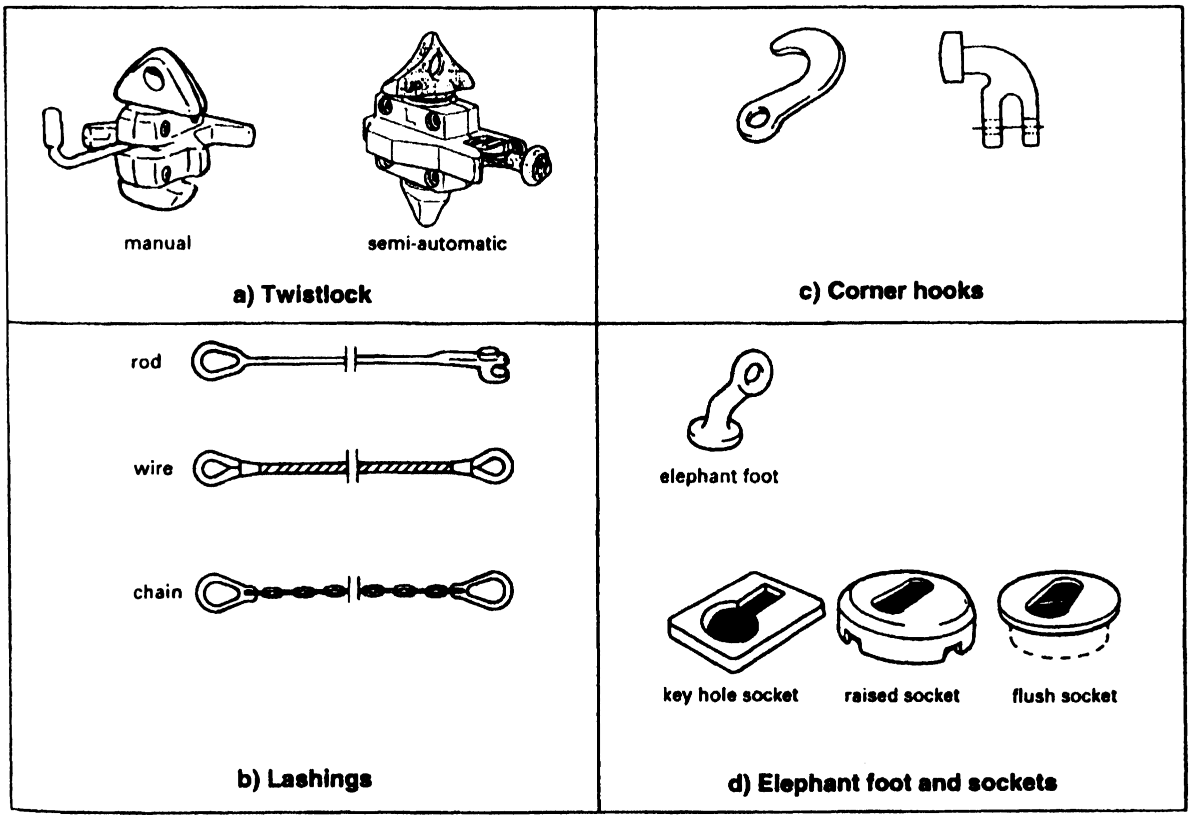


Figure 21 — Example of typical securing, lashing and handling equipment (see figure 22)



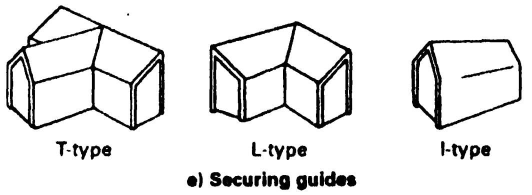
a) Twistlock

c) Corner hooks

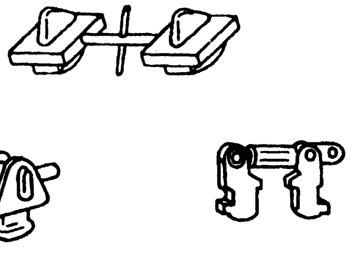
b) Lashings

d) Elephant foot and sockets

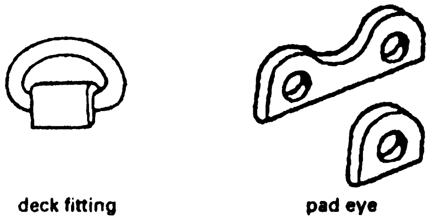
Figure 22 — Examples of typical securing, lashing and handling equipment



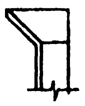
e) Securing guides



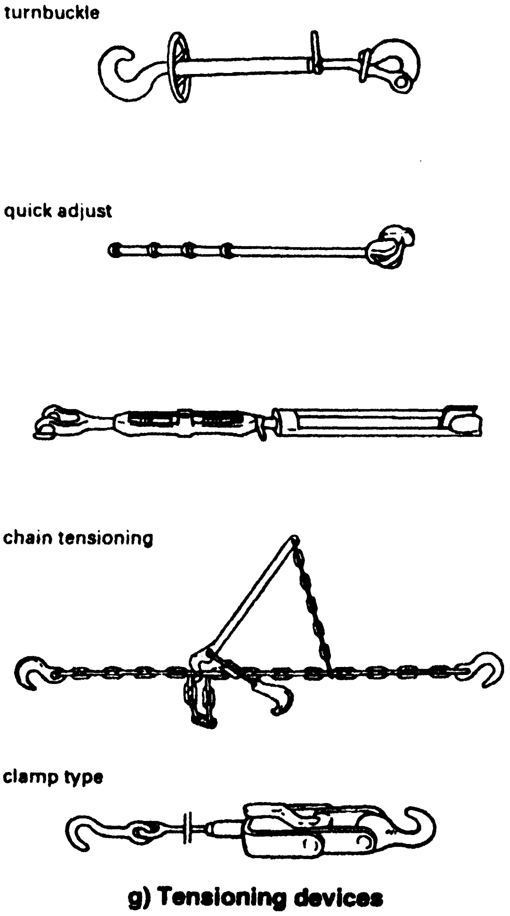
h) Bridge fittings



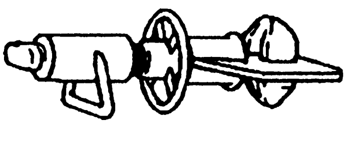
f) Securing points



i) Cell entry guides

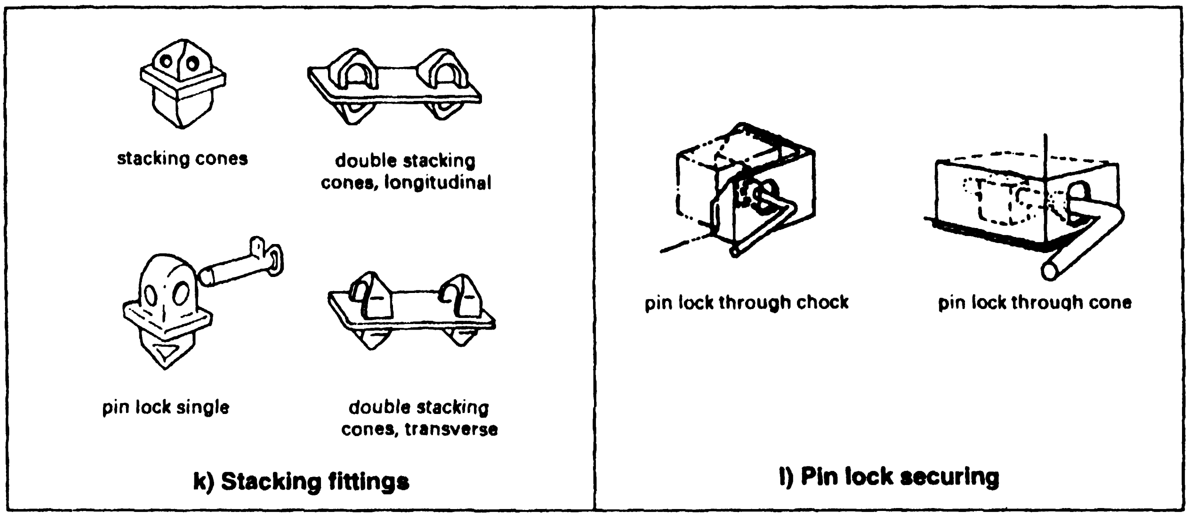


g) Tensioning devices



j) Buttress devices

Figure 22 — Examples of typical securing, lashing and handling equipment (*continued*)



k) Stacking fittings

l) Pin lock securing

Figure 22 — Examples of typical securing, lashing and handling equipment (*concluded*)

9.3 Securing of container for road and rail transport

9.3.1 General

When being transported by road or rail, containers are subjected to forces and vibrations arising from braking, shunting, cornering, acceleration, road surface and wind.

Securing methods should take these factors and those factors identified in 9.1 into account.

For road and rail transport, the container shall not project beyond the front or rear of the carrying vehicle.

9.3.2 Terminal trailer operation

Terminal operation in this context is container movement on terminal trailers at low speed over short distances within designated areas.

For such an operation, tie-down devices are not required but the container shall be correctly located on the trailer and prevented from moving horizontally; that is generally achieved by gathering guides or similar devices (see figure 23).

9.3.3 Public road operation

To ensure safe operation over public roads, the container shall be supported on the road vehicle by all four bottom corner fittings only or by the intermediate load transfer areas in the base structure only. The container shall also be secured to the road vehicle by all four bottom corner fittings (see figure 24).

The most usual method of securement is by twistlocks (see figure 25), which may be either fixed or retractable and, in some cases, adjustable in height. Alternative methods are securing cones (see figure 26) or securing guides (see figure 27) to give location and to resist horizontal forces with pins through the side or end apertures to resist upward vertical forces.

Dimensions in millimetres

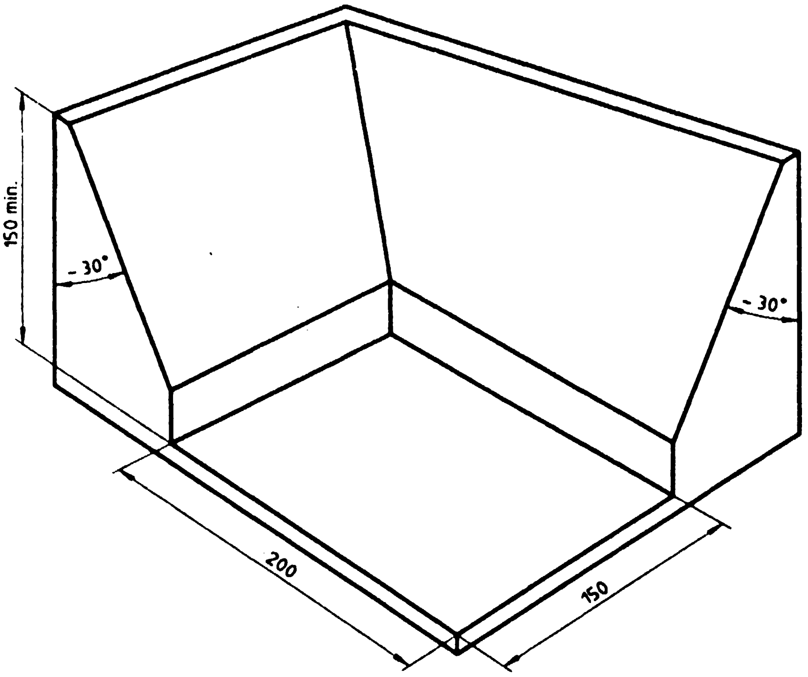


Figure 23 — Example of gathering guide

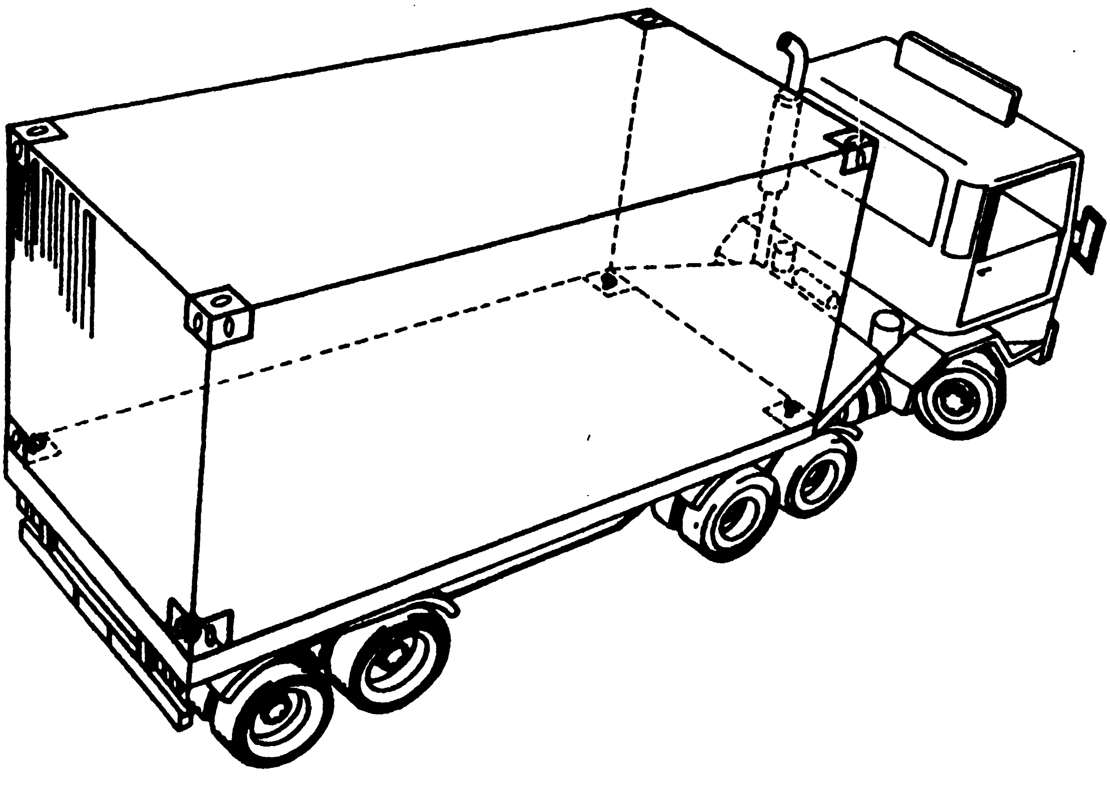
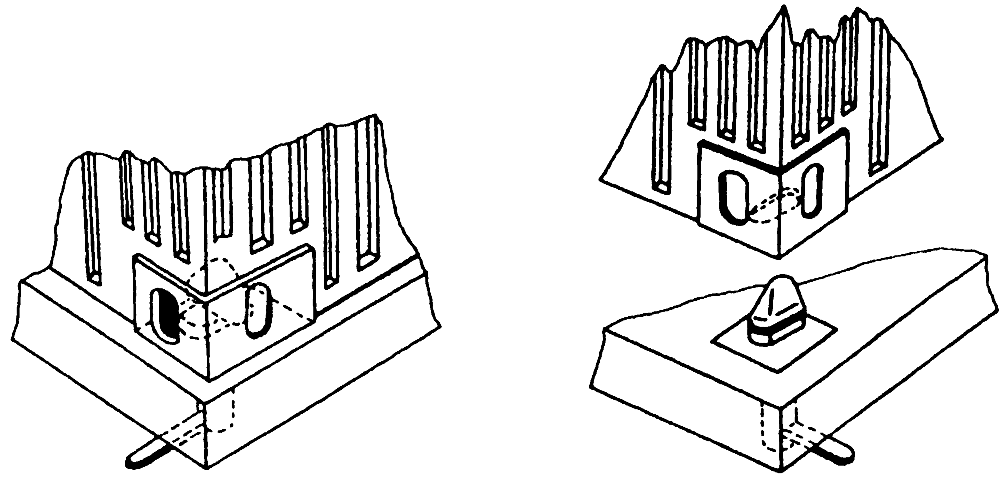


Figure 24 — Tractor/semi-trailer with twistlock chassis

To ensure safe operation

- the position of the securing devices shall be readily apparent;
- any intermediate securing devices shall be retracted or removed;
- before the vehicle is moved, the securing of the container shall be checked;
- before the container is lifted, any locking device shall be released.



a) Locked　　b) Unlocked

Figure 25 — Twistlock (retractable)

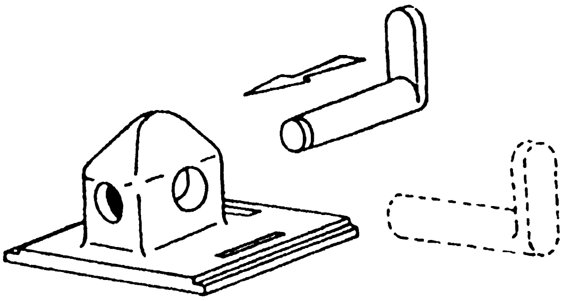


Figure 26 — Securing cone with pinlock

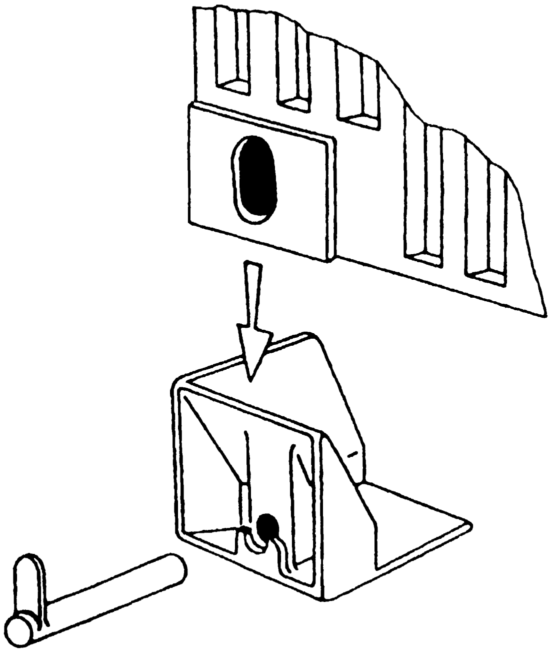


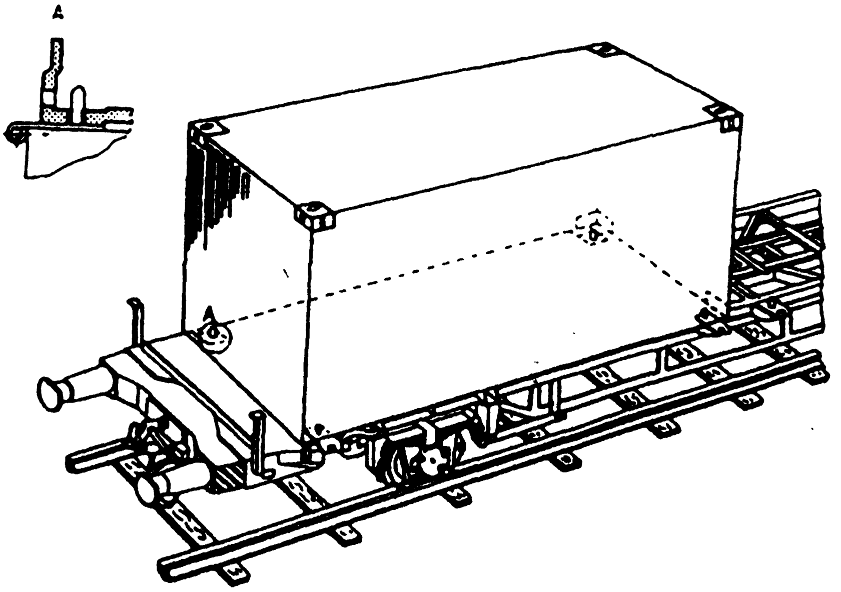
Figure 27 — Securing guide with pinlock

9.3.4 Rail vehicle operation

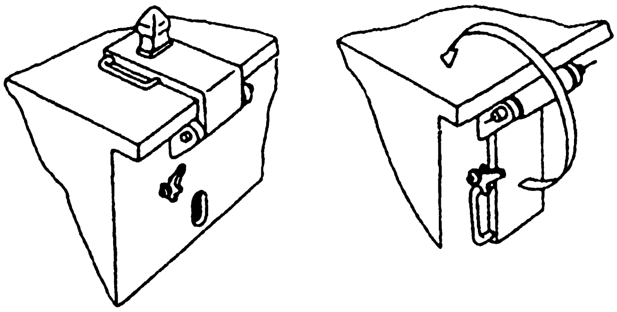
To *ensure safe operation* by *rail*, the container shall be supported on the rail vehicle by all four bottom corner fittings only or by the intermediate load transfer areas in the base structure only. The container should also be secured to the rail vehicle by all four bottom corner fittings either by twistlocks or by other means which will ensure compliance with 9.1. An example of a securing fitting used for transport by rail is shown in figure 28.

To ensure safe operation

- the position of the securing devices shall be readily apparent;
- any intermediate securing devices shall be retracted or removed;
- before the vehicle is moved, the securing of the container shall be checked;
- before the container is lifted, any locking device shall be released.



a) Overall view of a typical railway wagon



b) Detail of securing fitting

Figure 28 — Example of railway wagon with securing fittings in common use

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(Second Revision)

Page 29

Add the following annexes A to D

Annex A
(normative)

Twistlocks for securing of containers — Function, dimensions, strength requirements and testing

A.1 General

Twistlocks locate and secure containers

— either to each other within a stack (they are then acting through the corner fittings),

— or to the transport modes (they are then acting through the bottom corner fittings and the securing sockets of the carrying vehicle).

Twistlocks are also used to connect and lift empty containers.

A.2 Definitions

For the purposes of this annex, the following definitions apply to twistlocks.

A.2.1
collar
part of a twistlock which fits into the top or bottom apertures of a corner fitting and restrains connected containers from horizontal movements

A.2.2
eyehole
hole in the top cone of a twistlock to identify the proper orientation of the twistlock

A.2.3
handle tail
upbent part of the handle to identify the proper orientation of the twistlock in a stack of containers

A.2.4
fixed base
rigid part of a collar which allows manual pre-locking of the bottom part of a twistlock

A.2.5
triggering device
manually operated device which sets a twistlock

A.2.6
intermediate plate
part of a twistlock that carries the compression force between stacked containers

A.2.7
single-purpose twistlock
twistlock of asymmetrical design complying with the standard orientation

NOTE It can be used only in one of the two following alternatives:

— only in the top corner fitting of the container on which another container will be stacked (alternative A);

— only in the bottom corner fitting of a container which is going to be stacked on top of another container (alternative B).

A.2.8
double twistlock
twistlock fitted with both top cone and bottom cone

A.2.9
dual-purpose twistlock
twistlock that, having the same orientation, can be pre-locked either in a top corner fitting or in a bottom corner fitting

A.2.10
single lock
locking function of a twistlock in either the top cone or bottom cone

A.2.11
double lock
locking function of a twistlock in both the top cone and bottom cone

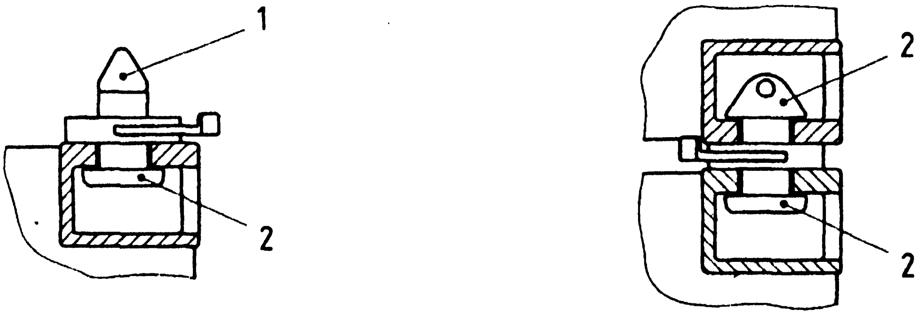
A.3 Types and description of securing twistlocks

A.3.1 Manual twistlocks

A.3.1.1 Manual twistlock with a fixed base and a single lock, two positions

A manual twistlock with a fixed base consists of the following:

- a top cone with an eyehole which can be rotated in relation to a fixed base;
- an intermediate plate with collars and a fixed base;
- a handle with a tail pointing upwards, attached to the shaft, moving in the horizontal plane and having two stop positions, one end fully closed and one end fully open; see Figure A.1.



Key

1 Unlocked

2 Locked

a) Fully open position **b) Fully closed position**

Figure A.1 — Manual twistlock with a fixed base and a single lock, two positions

A.3.1.2 Manual twistlock, with double locks, three positions

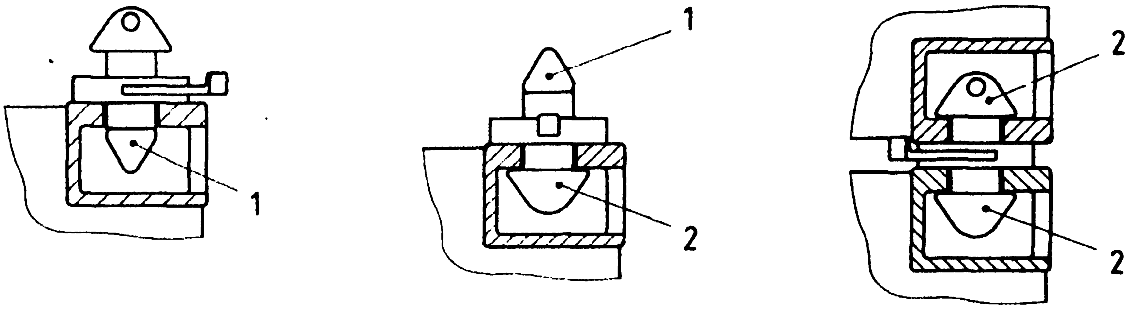
A manual twistlock with double locks, three positions, consists of the following:

a) a top cone with an eyehole and a bottom cone rigidly connected together by a shaft;

b) an intermediate plate with collars;

c) a handle with a tail pointing upwards, attached to the shaft, moving in the horizontal plane and having three positions; see Figure A.2:

  - **first position**: bottom cone fully open in order to engage the twistlock to the top corner fitting;
  - **second position**: top cone fully open and bottom cone closed in order to secure the twistlock to the top corner fitting and engage the twistlock to the bottom corner fitting of the next container;
  - **third position**: both top and bottom cones fully closed.



Key

1 Unlocked

2 Locked

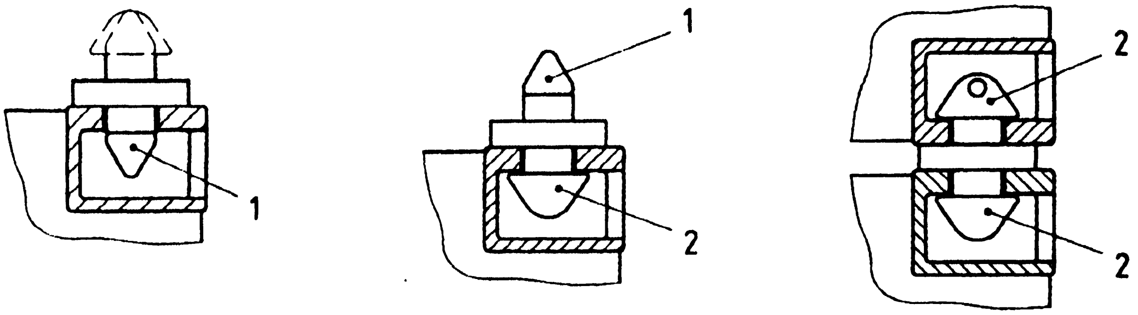
a) First position **b) Second position** **c) Third position**

Figure A.2 — Manual twistlock with double locks, three positions, premounted to the top corner fitting

A.3.2 Semi-automatic twistlock

A semi-automatic twistlock can be of both single purpose and dual purpose. It consists of the following:

- a top cone with an eyehole and a bottom cone, rigidly connected by a mechanism;
- an intermediate plate with collars;
- an internal mechanism automatically closing the cones either when a container is landed either onto the twistlock (see Figure A.3), or when the bottom cone fits into the top corner fitting of a container (see Figure A.4);
- a device for unlocking the twistlock.



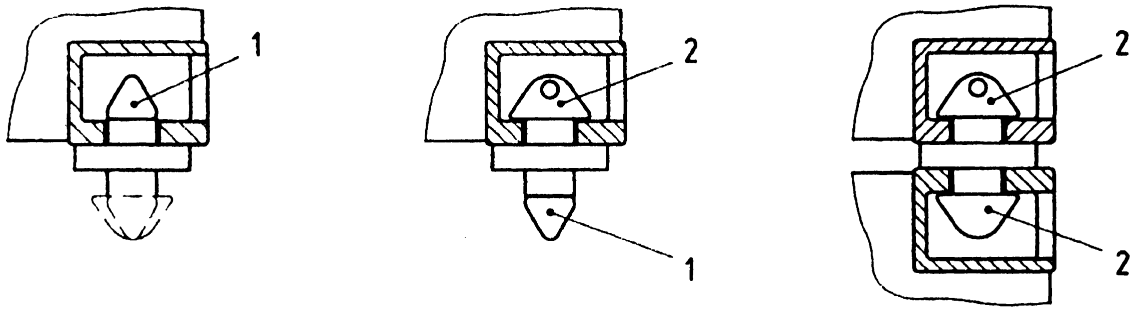
Key

1 Unlocked

2 Locked

a) **First position** b) **Second position** c) **Third position**

Figure A.3 — Semi-automatic twistlock, fitted to the upper corner fitting



Key

1 Unlocked

2 Locked

a) **First position** b) **Second position** c) **Third position**

Figure A.4 — Semi-automatic twistlock, fitted to the bottom corner fitting

A.4 Functional requirements and dimensions of twistlocks

A.4.1 General requirements

The top cone and bottom cone shall restrain connected containers against vertical movements.

The collar shall restrain connected containers against horizontal movements.

The eyehole in the top cone shall identify the top cone and facilitate the handling of the twistlock.

The tail of the handle, on a manual twistlock, shall identify the correct orientation of the twistlock in a container stack.

A.4.2 Manual twistlocks

A manual twistlock shall be oriented so that the cone with an eyehole is pointing upwards.

The handles shall always work in the horizontal plane and shall be fitted with a tail which shall be pointing upwards.

The unified direction of handle locking shall be clockwise, seen from above, to ensure safe locking.

All manual twistlocks, also those with three defined positions, shall have a positive locking mechanism which ensures that the twistlock will not be dislodged from the corner fitting during loading, unloading and transport of containers.

A.4.3 Semi-automatic twistlocks

A semi-automatic twistlock shall be oriented so that the cone with an eyehole is pointing upwards.

A semi-automatic twistlock shall be fitted with a means of identifying clearly the closing of both cones.

For semi-automatic twistlocks fitted with a handle, working in a horizontal plane, the handle shall be fitted with a tail pointing upwards and the closing of the cones shall be indicated by the handle in its leftmost position.

For semi-automatic twistlocks fitted with a pull wire, the closing of the cones shall be indicated by the full retraction of the wire.

For semi-automatic twistlocks fitted with other triggering devices, the closing of the cones shall be shown by an indicator designed to ensure consistency with the requirements expressed above.

A semi-automatic twistlock shall have a positive locking mechanism which ensures that the twistlock will not be dislodged from the corner fitting during loading and unloading of containers.

A.5 Dimensions

A.5.1 Top cone and bottom cone

The top cone and the bottom cone shall be designed so that, in fully locked position, the load carrying area is larger than 800 mm^2. The top cone and bottom cone shall not protrude into the part of the corner fitting cavity defined in Figure A.5, which is required for other lashing equipment.

A.5.2 Intermediate plate

The thickness of the intermediate plate shall be $30\,^{0}_{-5}$ mm. See Figure A.6.

The load carrying area (flange surface bearing area) of the intermediate plate shall be at least 4 500 mm^2. The twistlock shall be so designed as to have the maximum load transfer area towards the walls of the corner fittings.

A.5.3 Handle

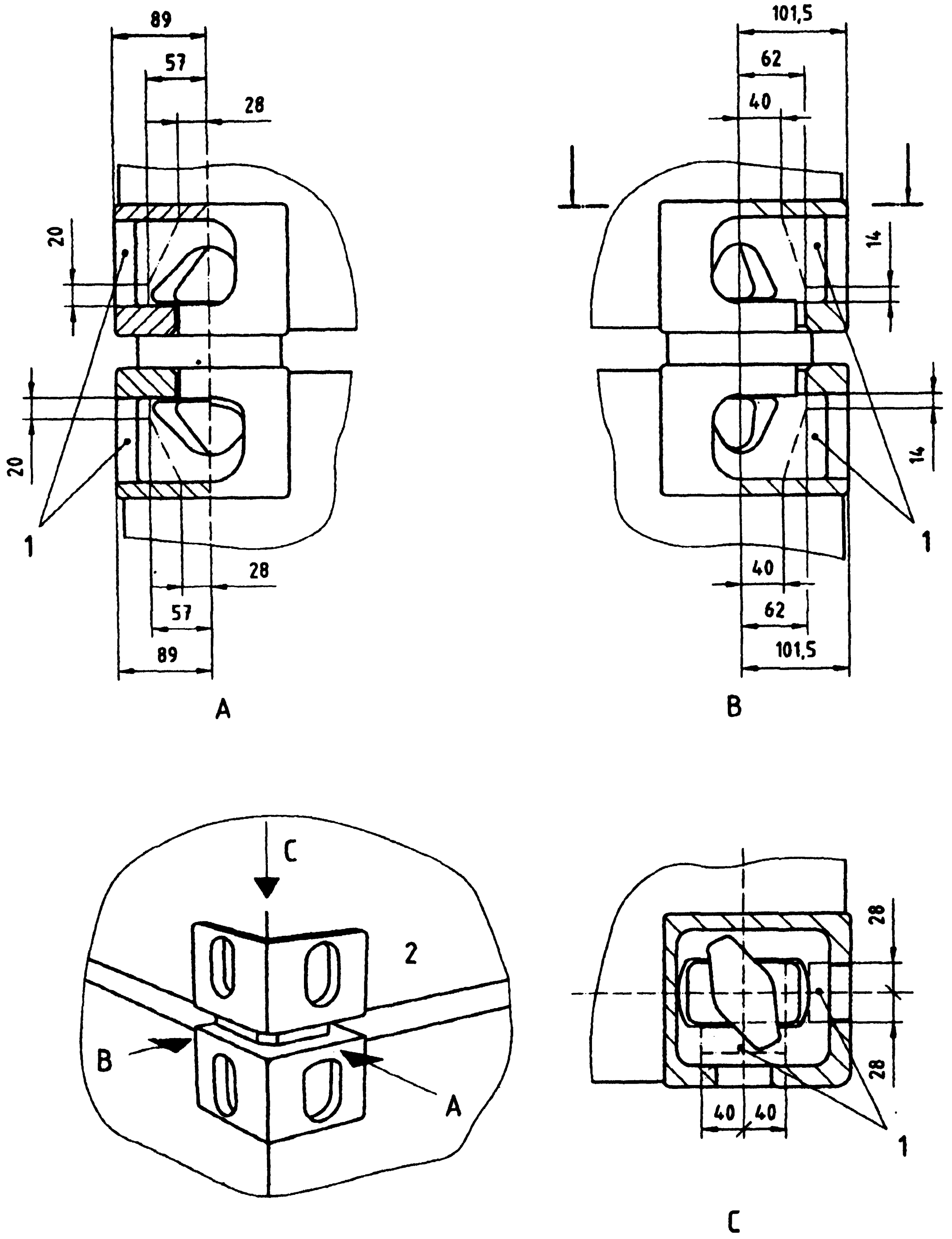
The length of the handle, measured from the centreline of the locks to the end, shall be a maximum of 160 mm.

The bent-up tail of the handle shall have a length of 25 mm ± 2 mm. See Figure A.7.

A.5.4 Collars

In order to fit into corner fitting apertures in accordance with ISO 1161, the collar shall have the dimensions shown in Figure A.8.

Dimensions in millimetres



Key

1) Restricted area

2) Container end

Figure A.5 — Restricted part of corner fitting cavity

Dimensions in millimetres

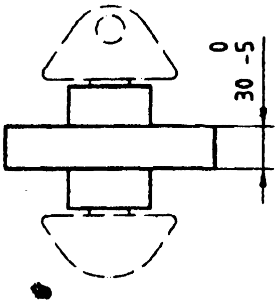


Figure A.6 — Intermediate plate

Dimensions in millimetres

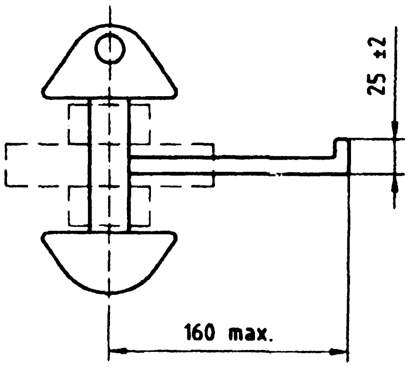


Figure A.7 — Length of the handle

Dimensions in millimetres

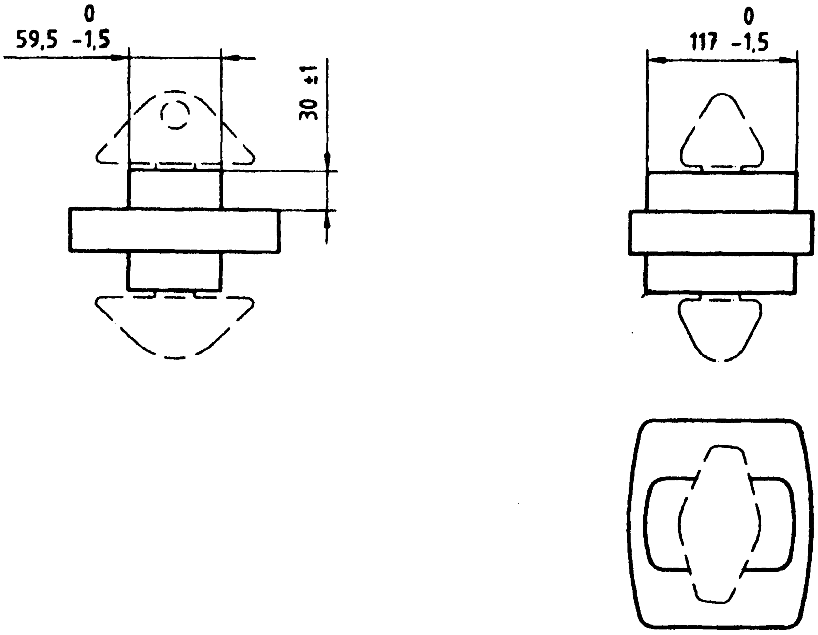
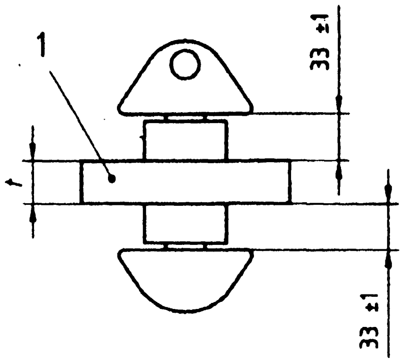


Figure A.8 — Dimensions of collars

A.5.5 Distance between top lock and bottom locks

The distance between the top and bottom locks shall be the actual thickness of the intermediate plate plus two times (33 ± 1) mm. See Figure A.9.

Dimensions in millimetres



Key

1 Intermediate plate

t is the thickness of the intermediate plate.

Figure A.9 — Distance between top and bottom locks

A.6 Material and design performance

The performance and reliability of twistlocks are functions of design and choice of material. Moving parts, especially springs holding the handle in position shall be designed so that their function does not cease because of stress, corrosion and dirt. For safety reasons it is also important that there are distinct stop positions.

A.7 Strength requirements

A.7.1 Tensile strength

Twistlocks shall withstand a tensile force of 150 kN without any permanent deformation. To verify the tensile strength requirement, test the twistlocks in accordance with A.8.1. The force shall act between the locking cones or the top locking cone and the fixed base.

Twistlocks used for lifting shall withstand a tensile force of at least 178 kN without any permanent deformation.

The tensile force shall be applied by means of two corner fittings or two equivalent devices in accordance with ISO 1161.

A.7.2 Compression strength

A.7.2.1 Compression strength of intermediate plate

The intermediate plate of the twistlock shall withstand a compression force of 850 kN without any permanent deformation or other abnormalities which would render it unsuitable for use. To verify the compression strength requirement, test the twistlock in accordance with A.8.2.1. The function of the twistlock shall not be affected by the test. The compression force shall be applied in a testing machine by two steel plates with holes equivalent to those in corner fittings in accordance with ISO 1161.

A.7.2.2 Compression strength of cones

The cones of the twistlocks shall withstand a compression force of 150 kN without any permanent deformation or other abnormalities which would render it unsuitable for use. The function of the twistlock shall not be affected by the test.

The compression force shall be applied to the top cone or to the bottom cone, in a test machine by one plain steel plate and one steel plate with a hole equivalent to that in corner fittings in accordance with ISO 1161. To verify the compression strength requirement, test the cone of the twistlock in accordance with A.8.2.2. The function of the twistlock shall not be affected by the test.

A.7.3 Shear strength

The collars of the twistlock shall withstand a shearing force of 300 kN longitudinally and transversally without any permanent deformation or other abnormalities which would render it unsuitable for use.

The force shall be applied in a testing machine by two steel plates with holes equivalent to those in corner fittings in accordance with ISO 1161.

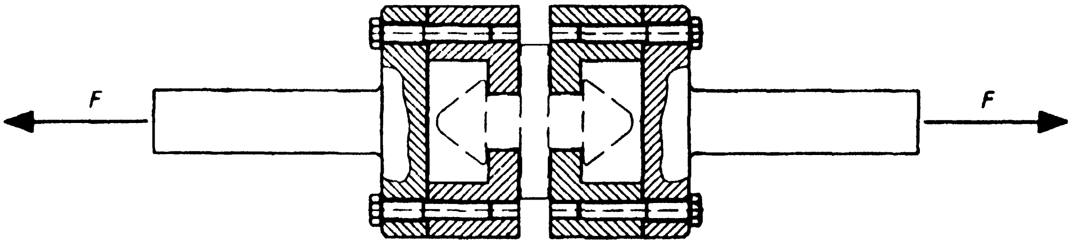
To verify the shear strength requirements, test the collar of the twistlock in accordance with A.8.3.

A.8 Test methods

A.8.1 Tensile test

When performing the tensile test, the tensile force shall be applied to the twistlock by a tensile test machine and two fittings with dimensions equivalent to the corner fittings specified in ISO 1161. See Figure A.10.

The test force shall be held for 5 min.



F is the test force.

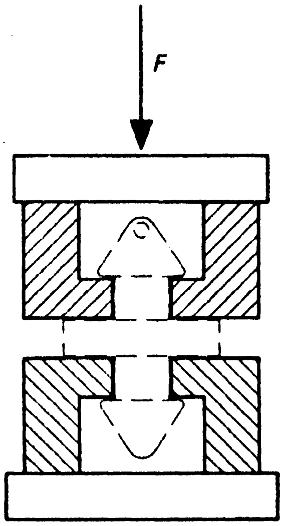
Figure A.10 — Tensile test

A.8.2 Compression test

A.8.2.1 Compression strength of intermediate plate

When performing the compression test, the intermediate plate shall be compressed in a testing machine by two steel plates with holes equivalent to those in corner fittings in accordance with ISO 1161. See Figure A.11.

The test force shall be applied for 5 min.



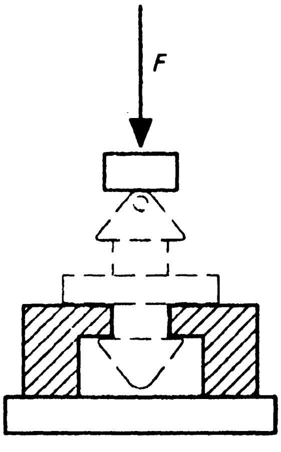
F is the test force.

Figure A.11 — Compression test on intermediate plate

A.8.2.2 Compression strength of cones

When performing the compression test on the top cone or the bottom cone, the cone shall be compressed in a testing machine by a flat steel plate and a steel plate with holes equivalent to those in corner fittings in accordance with ISO 1161. See Figure A.12.

The test force shall be applied for 5 min.



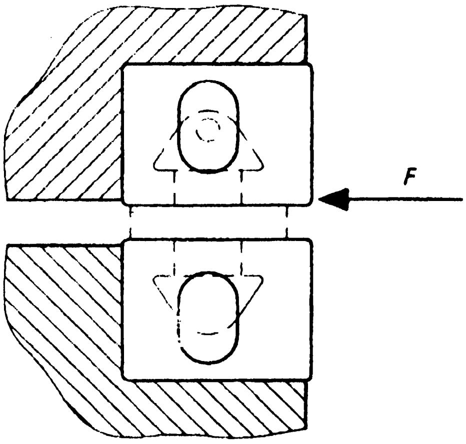
F is the test force.

Figure A.12 — Compression test on top or bottom cone

A.8.3 Shear strength test

For the shear strength test, the twistlock shall be placed in locked position in a test rig with holes equivalent to those in corner fittings in accordance with ISO 1161. See Figure A.13.

The twistlock shall be tested in both the longitudinal and transverse directions. The test force shall be applied for 5 min.



F is the test force.

Figure A.13 — Shear test

Annex B
(normative)

Latchlocks for securing of containers — Function, dimensions, strength requirements and testing

B.1 General

Latchlocks locate and secure containers

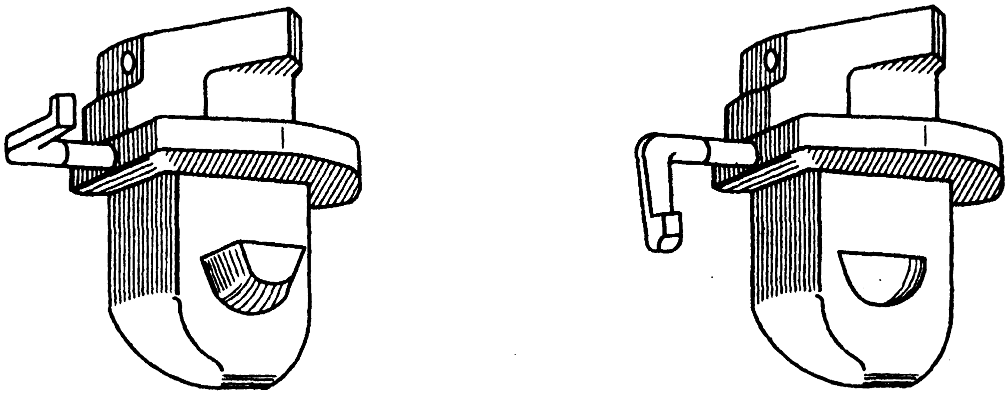
- either to each other within a stack (they are then acting through the corner fitting),
- or to the transport modes (they are then acting through the corner fitting and the securing sockets of the carrying vehicles).

Latchlocks are also used to connect and lift empty containers.

B.2 Definitions

For the purposes of this annex, the following definitions apply to latchlocks.

B.2.1
latchlock
a device locking containers, to each other within a stack, or to the transport mode, and securing containers by the protrusion of a latch(es), engaging in a corner fitting of a container or in a securing socket. See Figure B.1



a) Locked

b) Unlocked

Figure B.1 — Semi-automatic latchlock, single lock

B.2.2
semi-automatic latchlock
latchlock in which the top cone and/or bottom cone are/is activated by a mechanism and automatically locked

B.2.3
top cone
top body of a latchlock with or without a locking device, always engaging a bottom corner fitting

B.2.4
bottom cone
bottom body of a latchlock with or without a locking device, always engaging a top corner fitting or in a securing socket

B.2.5
latch
locking device of a latchlock, moved horizontally or swung out from a cone

B.2.6
handle
device attached to a latchlock, activating the mechanism and therefore the latch

B.2.7
collar
part of latchlock which fits into the top or bottom apertures of a corner fitting and restrains connected containers from horizontal movements

B.2.8
eye hole
hole in the top cone of a latchlock

B.2.9
fixed base
rigid part of a cone which allows manual pre-locking to a corner fitting of a container

B.2.10
intermediate plate
part of latchlock that carries the compression force between stacked containers

B.2.11
single-purpose latchlock
latchlock of asymmetrical design complying with the standard orientation

NOTE It can be used only in one of two following alternatives:

— only in the top corner fitting of a container on which another container will be stacked (alternative A);

— only in the bottom corner fitting of a container, which is going to be stacked on top of another container (alternative B).

B.2.12
double latchlock
latchlock fitted with both top cone and bottom cone

B.2.13
dual-purpose latchlock
latchlock that, having the same orientation, can be pre-locked either in a top corner or in a bottom corner fitting or in a securing socket

B.2.14
single lock
latchlock with locking function in either the top cone or the bottom cone only

B.2.15
double lock
latchlock with locking functions in both the top cone and bottom cone

B.3 Types and description of semi-automatic latchlocks

A semi-automatic latchlock can be of both single and dual purpose.

A single-purpose latchlock consists of the following:

a) a top cone with an eye hole and a bottom cone with a latch, connected to a mechanism;

b) an intermediate plate with collars;

c) an internal mechanism automatically locking the latch when the bottom cone engages into a top corner fitting, see Figure B.2.

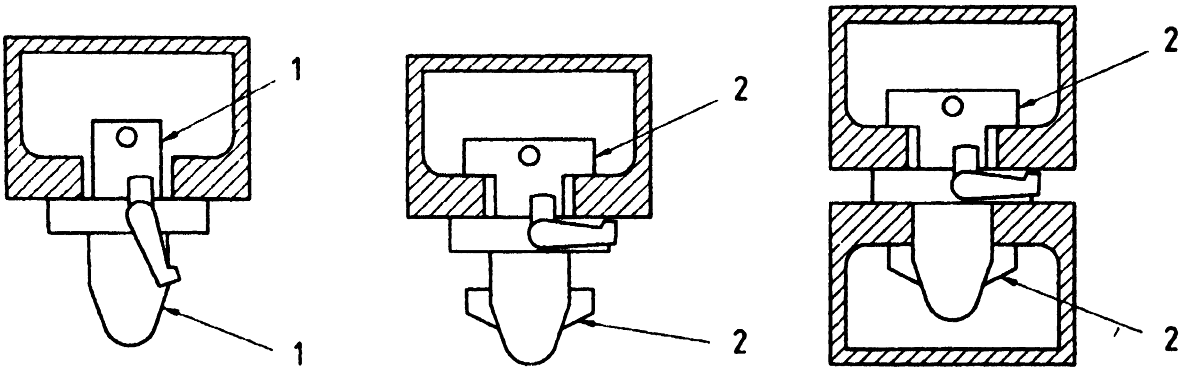
A dual-purpose latchlock consists of the following:

a) a top cone with an eye hole and a bottom cone, rigidly connected, each being fitted with a latch connected to an interval mechanism;

b) an intermediate plate with collars;

c) an internal mechanism which automatically locks the latches when

- either a container is landed onto the bottom latchlock locked into a top corner fitting (see Figure B.3),
- or the latchlock, locked into the bottom corner fitting of a container, is engaged into a corner fitting.



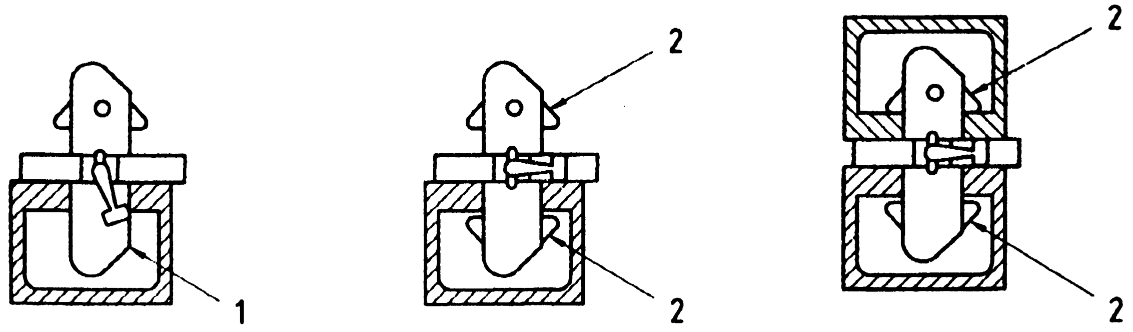
a) First position b) Second position c) Third position

Key

1 Unlocked

2 Locked

Figure B.2 — Semi-automatic latchlock, fitted to the bottom corner fitting



a) First position b) Second position c) Third position

Key

1 Unlocked

2 Locked

Figure B.3 — Semi-automatic latchlock, fitted to the upper corner fitting (dual-purpose only)

B.4 Functional requirements of latchlocks

B.4.1 General requirements

The top cone and the bottom cone shall restrain connected containers against vertical movements.

The collar shall restrain connected containers against horizontal movements.

The eyehole in the top cone shall identify the top cone and facilitate the handling of the latchlock.

The handle shall allow movement of a latch(es) and therefore locking and unlocking of the latchlock.

The positive locking mechanism shall ensure that the latchlock is not accidentally dislodged from the corner fitting during loading, unloading and transport of containers.

B.4.2 Semi-automatic latchlocks

A semi-automatic latchlock shall be oriented so that the cone with an eyehole is pointing upwards.

A semi-automatic latchlock shall be fitted with a means to clearly identify the locking of both cones.

For semi-automatic latchlocks fitted with a handle working in a vertical plane, the locking of the latch(es) shall be indicated by the handle in its horizontal position.

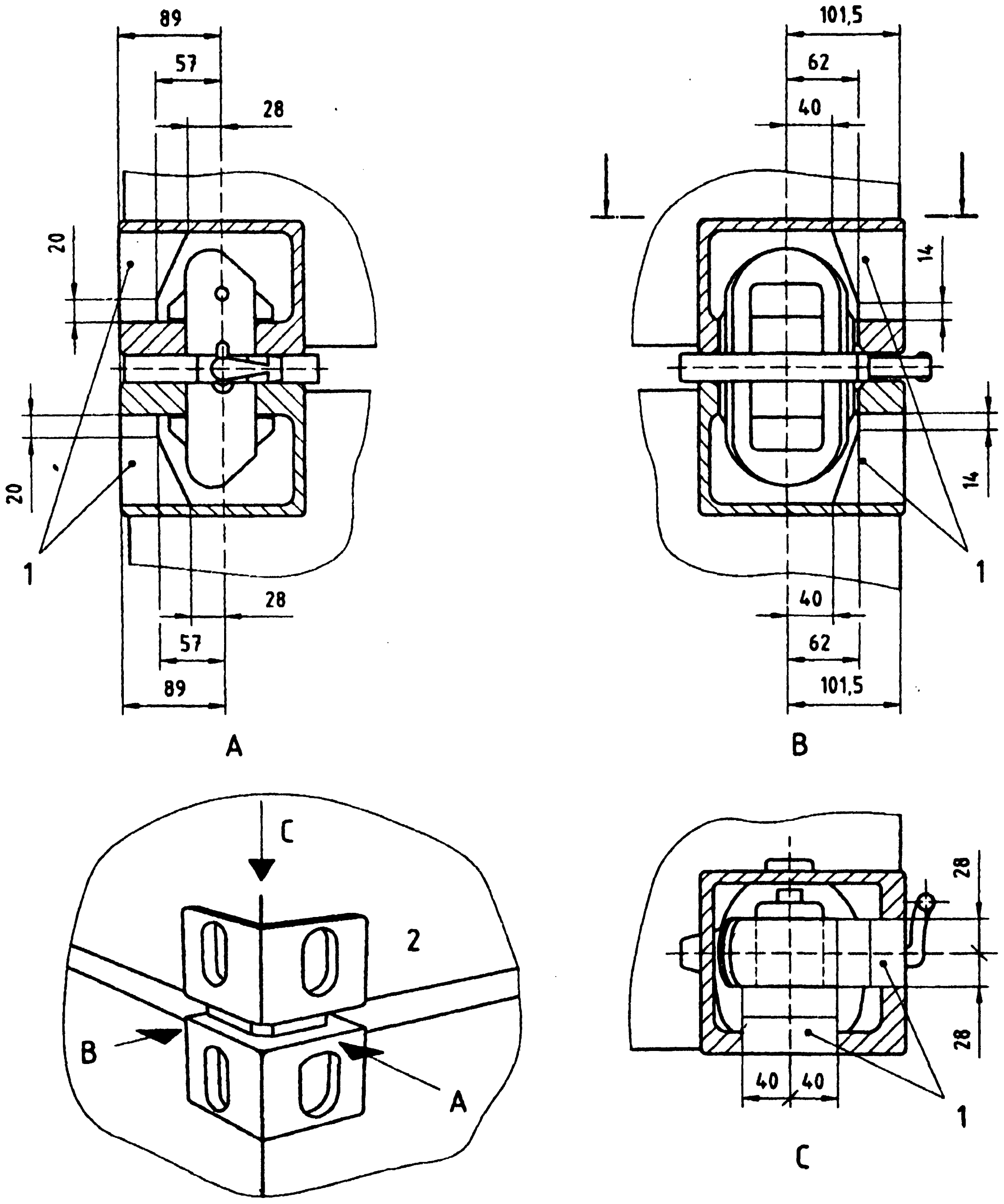
In the case of a semi-automatic latchlock with a handle working in a horizontal plane, the handle shall be fitted with a tail pointing upwards, and closing of the container shall be indicated by the handle in its leftmost position.

B.5 Dimensions

B.5.1 Top cone and bottom cone

The top cone and the bottom cone or respective latches shall be designed so that, in a fully locked position, the load carrying area is greater than 800 mm^2 in total when locked at both sides of a corner fitting aperture, or greater than 600 mm^2 when locked at one side of a corner fitting aperture. The top cone and bottom cone shall not protrude into the part of the corner fitting cavity, defined in Figure B.4, which is required for other lashing equipment.

Dimensions in millimetres



Key

1 Restricted area

2 Container end

Figure B.4 — Restricted part of corner fitting cavity

B.5.2 Intermediate plate

The thickness of the intermediate plate shall be $30\,^{0}_{-5}$ mm.

The compression load carrying area (flange surface bearing area) of the intermediate plate shall be at least 4 500 mm^2. The latchlock shall be so designed as to have the maximum load transfer area towards the walls of the corner fittings.

B.5.3 Handle

In the case of a handle working in a vertical plane, the length of the shank part of the handle, measured from the centreline of the locks to the inside of the bent handle, and the length of the bent handle from the centre of the shank to the end shall be in accordance with Figure B.5.

Dimensions in millimetres

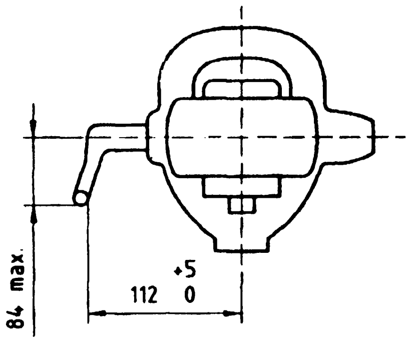


Figure B.5 — Length of the handle working in a vertical plane

In the case of a handle working in a horizontal plane, the length of the handle, measured from the centre of the locks to the end, and the bent-up tail of the handle shall be in accordance with Figure B.6.

Dimensions in millimetres

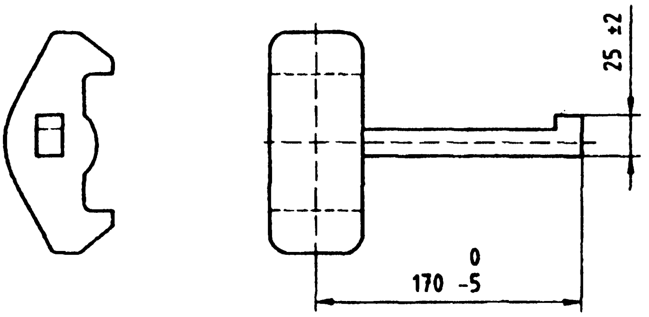


Figure B.6 — Length of handle working in a horizontal plane

B.5.4 Collars

The collars shall fit into the top and bottom of corner fitting apertures in accordance with ISO 1161 and shall have the dimensions shown in Figure B.7.

Dimensions in millimetres

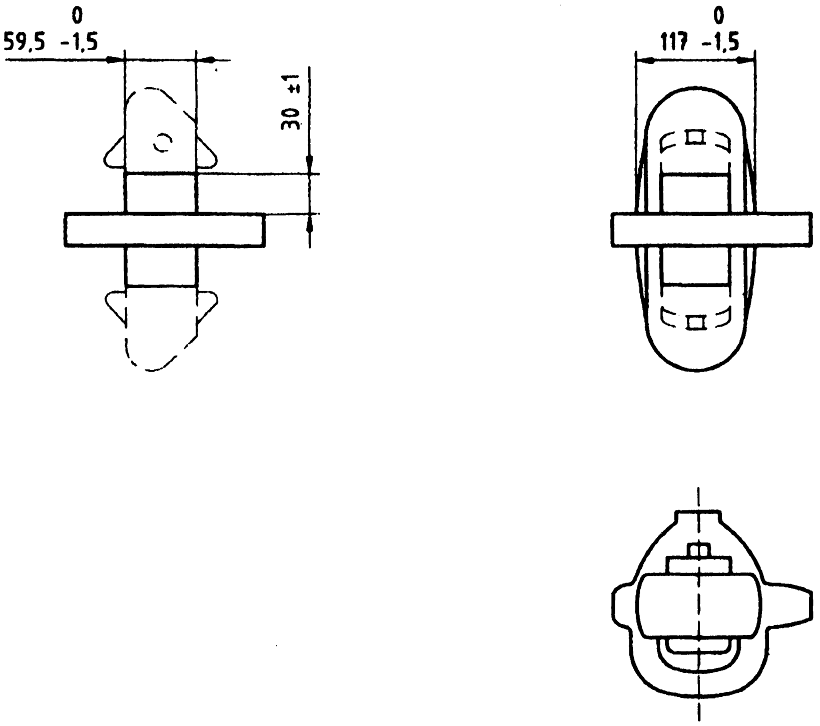


Figure B.7 — Dimensions of collars

B.5.5 Distance between top lock and bottom lock

The distance between the top and bottom locks shall be as shown in Figure B.8.

Dimensions in millimetres

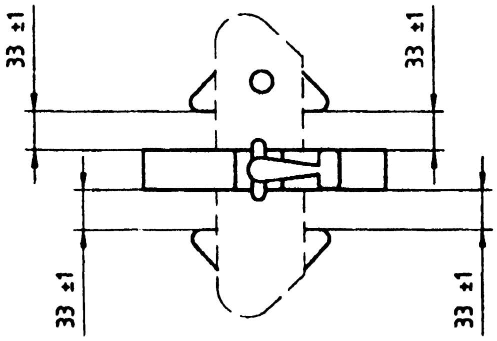


Figure B.8 — Distance between top and bottom latches

B.6 Material and design performance

The performance and reliability of latchlocks are functions of the design and choice of material. Springs holding the handle in position shall be designed so that their function does not cease because of stress, corrosion or dirt. For safety reasons it is also important that there are distinct stop positions.

B.7 Strength requirements

B.7.1 Tensile strength

The latchlock shall withstand a tensile force of 150 kN without any permanent deformation or other abnormalities which would render it unsuitable for use. To verify the tensile strength requirement, test the latchlock in accordance with B.8.1. The force shall act between the locking cones or the top locking cone and the fixed base.

Latchlocks used for lifting shall withstand a tensile force of at least 178 kN without any permanent deformation or other abnormalities which would render it unsuitable for use.

The tensile force shall be applied by means of two corner fittings or two equivalent devices in accordance with ISO 1161.

B.7.2 Compression strength

B.7.2.1 Compression strength of intermediate plate

The intermediate plate of the latchlock shall withstand a compression force of 850 kN without any permanent deformation or other abnormalities which would render it unsuitable for use. To verify the compression strength requirement, test the latchlock in accordance with B.8.2.1 The function of the latchlock shall not be affected by the test. The compression force shall be applied in a testing machine via two steel plates with holes equivalent to those in corner fittings in accordance with ISO 1161.

B.7.2.2 Compression strength of cones

The cones of the latchlock shall withstand a compression force of 150 kN without any permanent deformation or other abnormalities which would render it unsuitable for use. The function of the latchlock shall not be affected by the test.

The compression force shall be applied to the top cone or to the bottom cone, in a testing machine by one plain steel plate and one steel plate with a hole equivalent to those in corner fittings in accordance with ISO 1161. To verify the compression strength requirement, test the latchlock in accordance with B.8.2.2. The function of the latchlock shall not be affected by the test.

B.7.3 Shear strength

The collar of the latchlock shall withstand a shearing force of 300 kN longitudinally and transversally without any permanent deformation or other abnormalities which would render it unsuitable for use.

The force shall be applied in a testing machine by two steel plates with holes equivalent to those in corner fittings in accordance with ISO 1161.

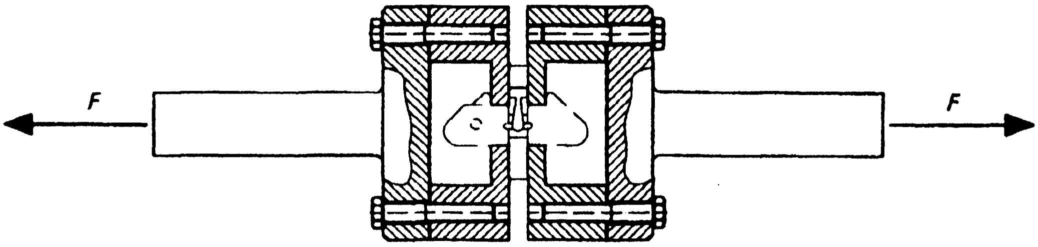
To verify the shear strength requirements, test the stacking fitting in accordance with B.8.3.

B.8 Test methods

B.8.1 Tensile test

The tensile test force shall be applied to the latchlock by a tensile test machine and two fittings with dimensions equivalent to corner fittings in accordance with ISO 1161. See Figure B.9.

The test force shall be applied for 5 min.



F is the test force.

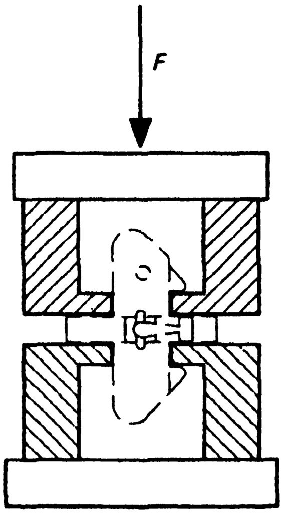
Figure B.9 — Tensile test

B.8.2 Compression test

B.8.2.1 Compression strength of intermediate plate

When performing the compression test, the intermediate plate shall be compressed in a testing machine by two steel plates with holes equivalent to those in corner fittings in accordance with ISO 1161. See Figure B.10.

The test force shall be applied for 5 min.



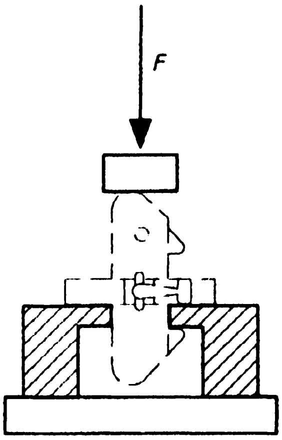
F is the test force.

Figure B.10 — Compression test on intermediate plate

B.8.2.2 Compression strength of cones

When performing the compression test to the top or the bottom cone, the cones shall be compressed in a testing machine by a flat steel plate and a steel plate with a hole equivalent to those in corner fittings in accordance with ISO 1161. See Figure B.11.

The test force shall be applied for 5 min.



F is the test force.

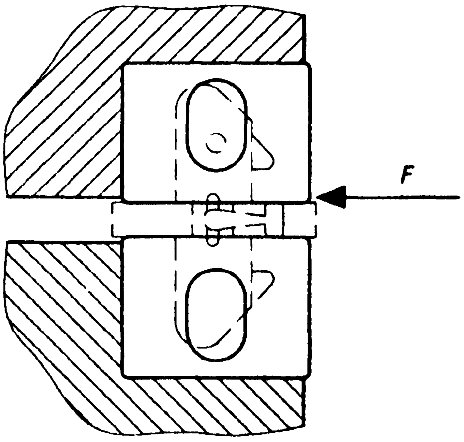
Figure B.11 — Compression test on top or bottom cone

B.8.3 Shear strength test

For the shear strength test, the latchlock shall be placed in locked position in a testing rig with holes equivalent to those in corner fittings in accordance with ISO 1161. See Figure B.12.

The latchlock shall be tested both in longitudinal and transverse directions.

The test force shall be applied for 5 min.



F is the test force.

Figure B.12 — Shear test

Annex C

(normative)

Stacking fittings for securing of containers — Function, dimensions, strength requirements and testing

C.1 General

Stacking fittings, or stacking cones, or stackers, locate and secure containers horizontally either to each other, within a stack, or to the transport mode. They shall act through the container corner fittings or through sockets on the transport mode. Stacking fittings are always used together with other lashing and securing devices.

C.2 Definitions

For the purposes of this annex, the following definitions apply to stacking fittings.

C.2.1

cone

part of a stacking fitting which fits into the top or bottom aperture of a corner fitting or a securing socket and restrains connected containers from horizontal movements

C.2.2

intermediate plate

part of a stacking fitting that carries the compression force between stacked containers

C.2.3

single cone

stacking fitting fitted with one top cone and one bottom cone

C.2.4

double cones

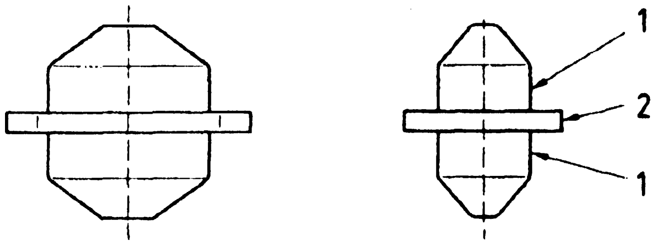
stacking fitting fitted with two top cones and two bottom cones

NOTE They can be of transverse or longitudinal type.

C.3 Types and description of stacking fittings

C.3.1 Single-cone stacking fitting

A single-cone stacking fitting consists of two cones opposite to each other, attached to an intermediate plate. See Figure C.1.



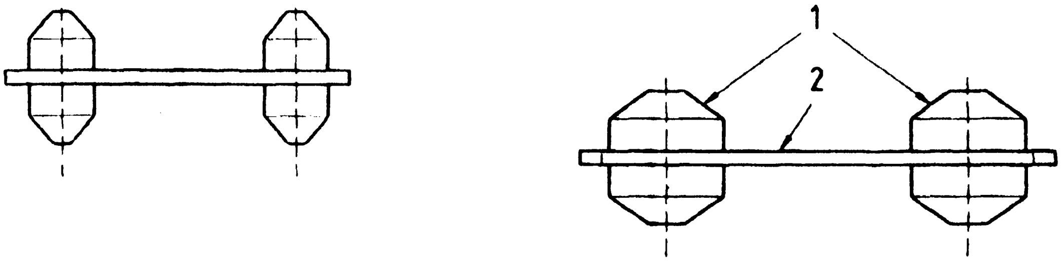
Key

1 Cone
2 Intermediate plate

Figure C.1 — Single-cone stacking fitting

C.3.2 Double-cone stacking fitting

A double-cone stacking fitting consists of two cones opposite each other, attached to the ends of an intermediate plate. They are designed to connect and secure containers to each other and are of transverse or longitudinal type. The transverse type secures containers which have sides parallel to each other. The longitudinal type secures containers having their ends parallel to each other. See Figure C.2.



a) Transverse type

b) Longitudinal type

Key

1 Cone
2 Intermediate plate

Figure C.2 — Double-cone stacking fittings

C.4 Functional requirements and dimensions of stacking fittings

C.4.1 General requirements

The top cone and the bottom cone shall restrain connected containers against horizontal movements.

The intermediate plate shall secure containers to each other. Double-cone stacking fittings can only be used when the top corner fittings of the container layers are on the same level.

C.4.2 Top and bottom cones

The top and bottom cones shall be designed so that they do not protrude into that area of the corner fitting which is required for other lashing equipment. See Figure C.3 which specifies the restricted area.

C.4.3 Intermediate plate

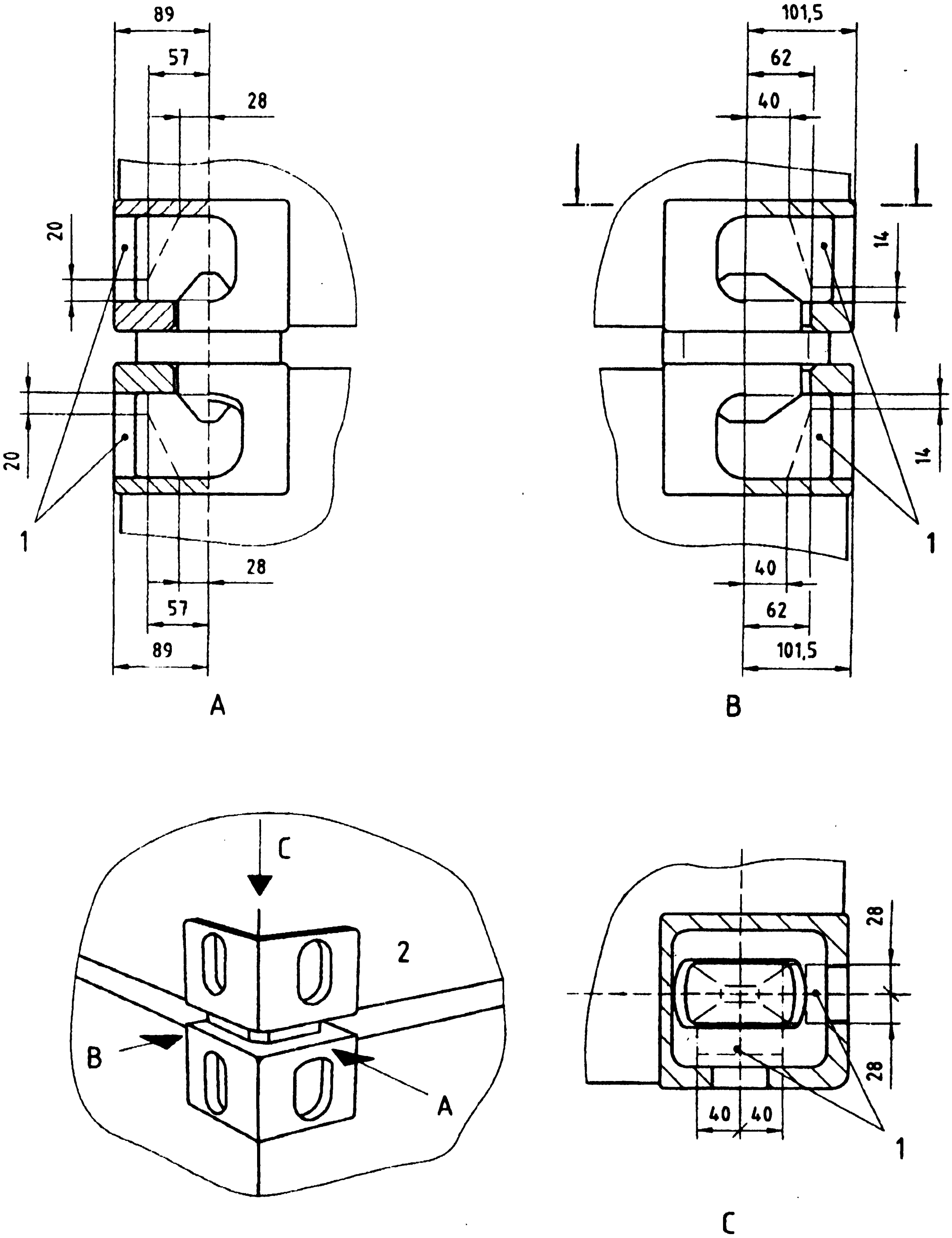
The thickness of the intermediate plate shall be minimum 12 mm. In particular, in a stack of containers all intermediate plates should have the same thickness.

The compression load carrying area (flange surface bearing area) of the intermediate plate shall be at least 4 500 mm^2. The intermediate plate shall be so designed as to have the maximum load transfer area towards the walls of the corner fittings.

C.4.4 Cones

The cones shall fit into the top and bottom of corner fitting apertures in accordance with ISO 1161, and shall have the dimensions shown in Figure C.4.

Dimensions in millimetres



Key

1 Restricted area

2 Container end

Figure C.3 — Restricted part of a corner fitting cavity

Dimensions in millimetres

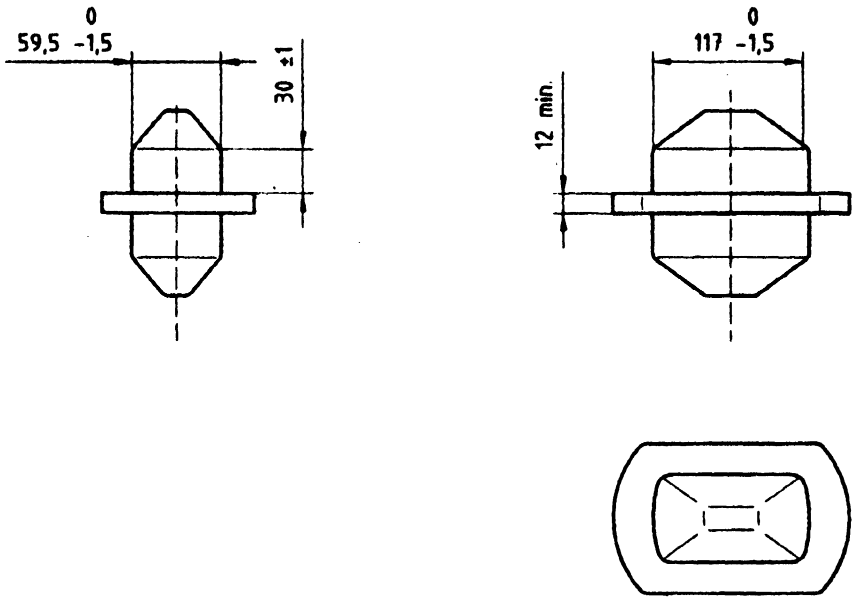


Figure C.4 — Dimensions of cone

C.4.5 Distance between cones

The distance between the cones on a transverse double-cone stacking fitting shall be in accordance with the container spacing of the ship where it is to be used. On a particular ship, the distance between the cones shall be the same and in accordance with the spacing selected for this ship.

The distance between the cones on longitudinal double-cone stacking fittings shall be 280 mm ± 5 mm, as shown in Figure C.5.

Dimensions in millimetres

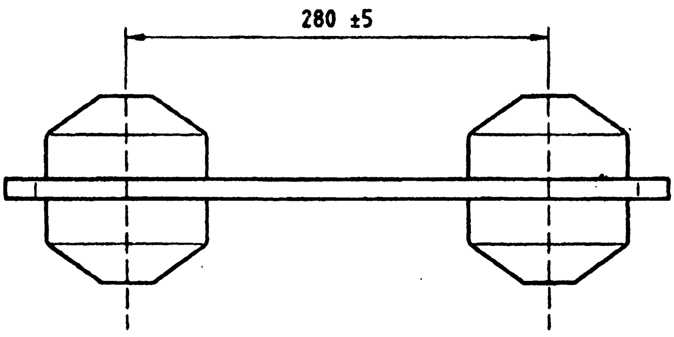


Figure C.5 — Distance between cones

C.5 Material and design performance

The performance and reliability of stacking fittings are functions of the design and choice of material. Stacking fittings shall be designed so that their function does not cease because of stress, corrosion or dirt.

C.6 Strength requirements

C.6.1 Compression strength of intermediate plate

The intermediate plate of single- and double-cone stacking fittings shall withstand a compression force of 850 kN without any permanent deformation or other abnormalities which would render it unsuitable for use.

To verify the compression strength requirement, test the stacking fitting in accordance with C.7.1. The compression force shall be applied in a testing machine by two steel plates with holes equivalent to those in corner fittings in accordance with ISO 1161.

C.6.2 Compression strength of cones

The cones of single- and double-cone stacking fittings shall withstand a compression force of 150 kN without any permanent deformation or other abnormalities which would render it unsuitable for use.

The compression force shall be applied to the top cone in a testing machine by one flat steel plate and one steel plate with a hole equivalent to those in corner fittings in accordance with ISO 1161.

To verify the compression strength requirement, test the stacking fitting in accordance with C.7.2.

C.6.3 Shear strength

The stacking fitting shall withstand a shearing force of 300 kN longitudinally and transversally without any permanent deformation or other abnormalities which would render it unsuitable for use.

The force shall be applied in a testing machine by two steel plates with holes equivalent to those in corner fittings in accordance with ISO 1161.

To verify the shear strength requirements, test the stacking fitting in accordance with C.7.3.

C.6.4 Tensile and compression strength of intermediate plate

The intermediate plate of a double-cone stacking fitting shall withstand a tensile and a compression force (horizontal) of 300 kN without any permanent deformation or other abnormalities which would render it unsuitable for use. To verify the strength requirement, test the stacking fitting in accordance with C.7.4. The force shall act between the cones, see Figure C.9.

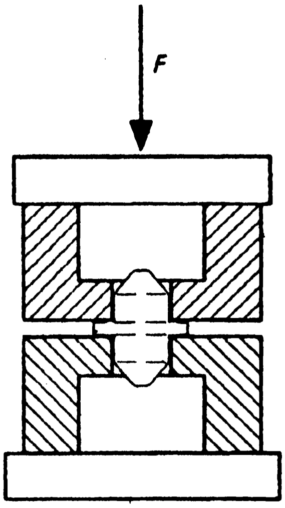
The force shall be applied by means of a device, longitudinal or transverse depending of type, simulating four corner fittings in accordance with ISO 1161.

C.7 Test methods

C.7.1 Compression strength of intermediate plate

When performing the compression test, the intermediate plate shall be compressed in a testing machine by two steel plates with holes equivalent to those in corner fittings in accordance with ISO 1161. See Figure C.6.

The test force shall be applied for 5 min.



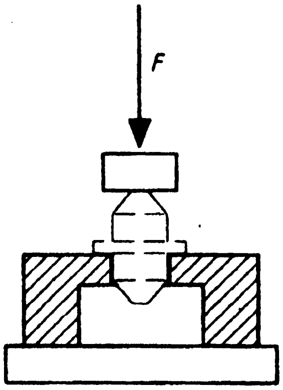
F is the test force.

Figure C.6 — Compression test on intermediate plate

C.7.2 Compression strength of cones

When performing the compression test to the top cone or the bottom cone, it shall be compressed in a testing machine by a flat steel plate and a steel plate with holes equivalent to those in corner fittings in accordance with ISO 1161. See Figure C.7.

The test load shall be applied for 5 min.



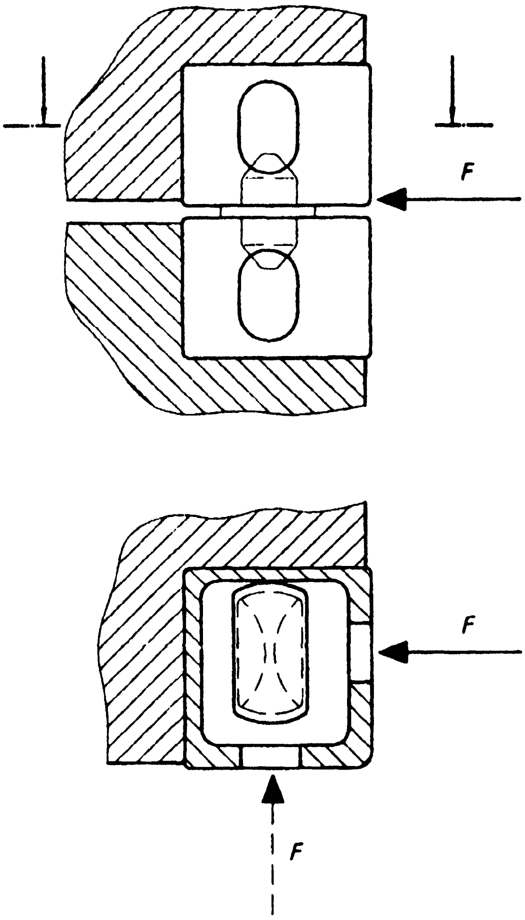
F is the test force.

Figure C.7 — Compression test on top cone on bottom cone

C.7.3 Shear strength test

For the shear strength test, the stacking fitting shall be placed in the test rig with holes equivalent to those in corner fittings in accordance with ISO 1161. See Figure C.8.

The stacking fitting shall be tested in both the longitudinal and transverse directions. The test force shall be applied for 5 min.



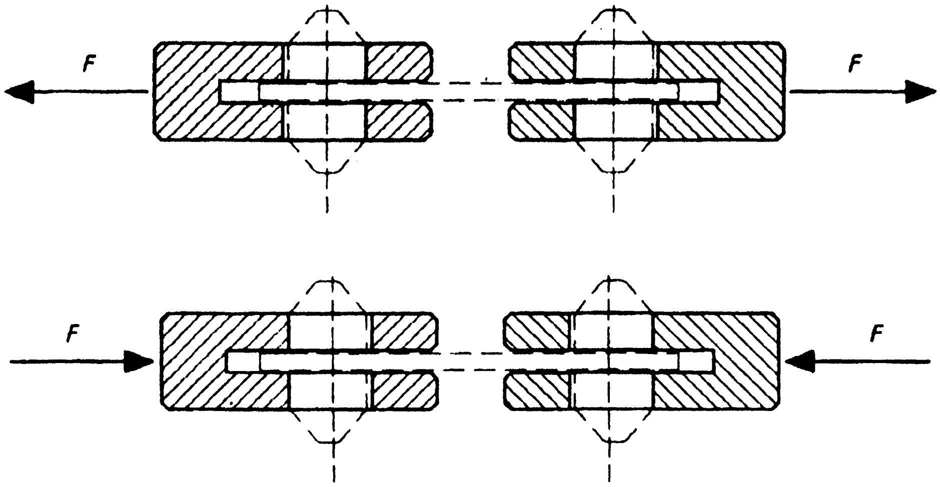
F is the test force.

Figure C.8 — Shear test

C.7.4 Tensile and compression test, racking resistance test

The force shall be applied to the double-cone stacking fitting in a tensile test machine by four fittings with dimensions equivalent to corner fittings in accordance with ISO 1121. See Figure C.9.

The test force shall be applied for 5 min in each direction.



F is the test force.

Figure C.9 — Tensile and compression test

Annex D
(normative)

Lashing rod systems, including tensioning devices, for securing of containers — Function, dimensions, strength requirements and testing

D.1 General

Lashing rods and tensioning devices secure layers of containers, within a stack, to the transport mode. They act through the container fittings to the transport mode. They are always used together with other securing devices such as stacking fittings and twistlocks.

D.2 Definitions

For the purposes of this annex, the following definitions apply to lashing rods.

D.2.1
lashing rod
rod with a top which fits into a corner fitting or to a connecting part (i.e. a hook) which in turn fits into a corner fitting, and a bottom part which fits into a tensioning device (i.e. a turnbuckle)

See Figures D.1 to D.5.

D.2.2
securing hook
securing fitting which fits into a corner fitting and to which a lashing rod can be attached

See Figures D.1 and D.5.

D.2.3
plug hook
fixed part of a lashing rod which fits into a corner fitting

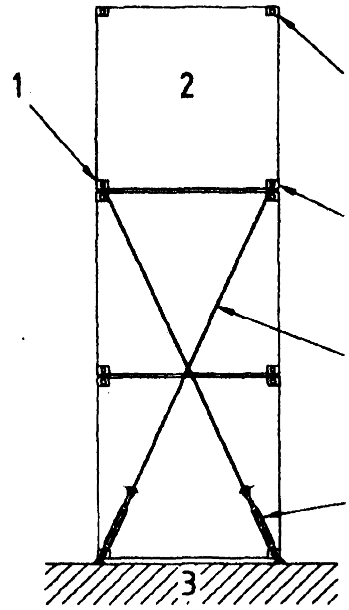
See Figure D.3.

D.2.4
hinge hook
articulated part of a lashing rod which fits into a corner fitting

See Figure D.4.

D.2.5
tensioning device
device in which one end fits into the bottom part of a lashing rod and in the other end fits onto the transport mode (i.e. a pad eye)

See Figure D.1.



Key

1 Securing hook
2 Container
3 Ship structure
4 Top corner fitting
5 Bottom corner fitting
6 Lashing rod
7 Tensioning device

Figure D.1 — Lashing rod system

D.3 Functional requirements and dimensions

D.3.1 Lashing rod

A lashing rod shall be designed so as to

- be directly connected to the corner fitting of a container or to a device that fits into the corner fitting (securing hook),
- be connected to a tensioning device, and
- have an appropriate length so that, together with the tensioning device, it fits between the corner fittings and the transport mode.

See Figures D.2 to D.4.

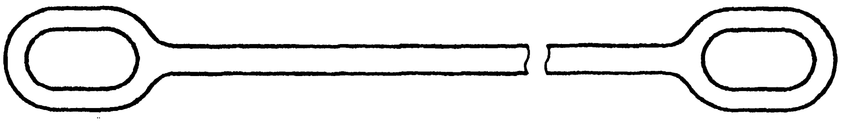


Figure D.2 — Lashing rod

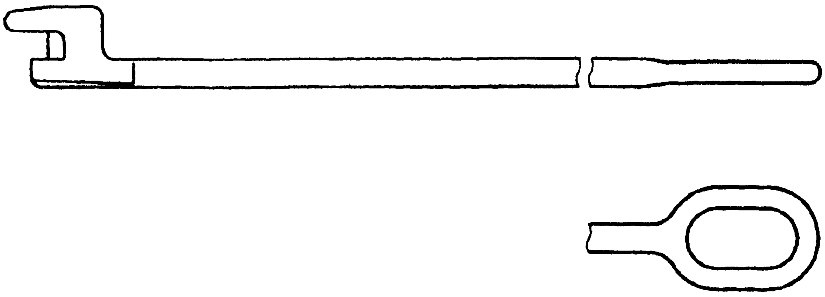


Figure D.3 — Lashing rod, plug hook

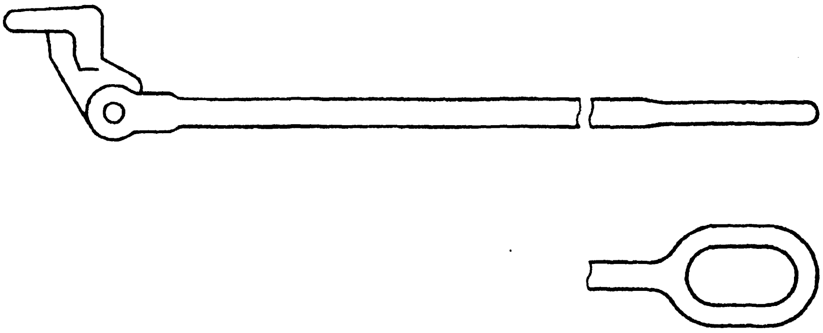


Figure D.4 — Lashing rod, hinged hook

D.3.2 Securing hook

A securing hook shall be designed so as to be connected to the corner fitting of a container and to a lashing rod. See Figure D.5.

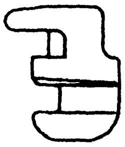


Figure D.5 — Securing hook

D.3.3 Tensioning device

A tensioning device shall be designed so as to be connected to the bottom part of a lashing rod and at the other end to the transport mode. It shall be of sufficient length so that, together with the lashing rod, it fits between the corner fittings and the transport mode. It shall be equipped with a device which locks the tensioning device, i.e. locking nuts. See Figure D.6. The tensioning device should be kept neither slack nor over-tensioned.

NOTE Over-tensioning of these devices can damage containers.

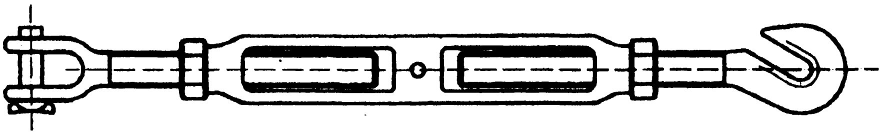


Figure D.6 — Typical example of a tensioning device, turnbuckle with locking nuts

D.3.4 Top end of lashing rod or securing hook

The top end of a rod or a securing hook shall be designed so that it does not protrude into the part of the corner fitting cavity, defined in Figure D.7, which is required for other lashing equipment.

D.3.5 Bottom end of lashing rod

The bottom end of the rod shall be designed so that it fits to a tensioning device.

D.3.6 Other parts of lashing rod and tensioning device

Other parts of lashing rods and tensioning devices shall be designed so that they fit together or to the transport mode.

D.4 Material and design performance

The performance and reliability of lashing rods are functions of the design and choice of material. They shall be designed so that their function does not cease because of fatigue, corrosion or dirt.

D.5 Tensile strength of lashing rod

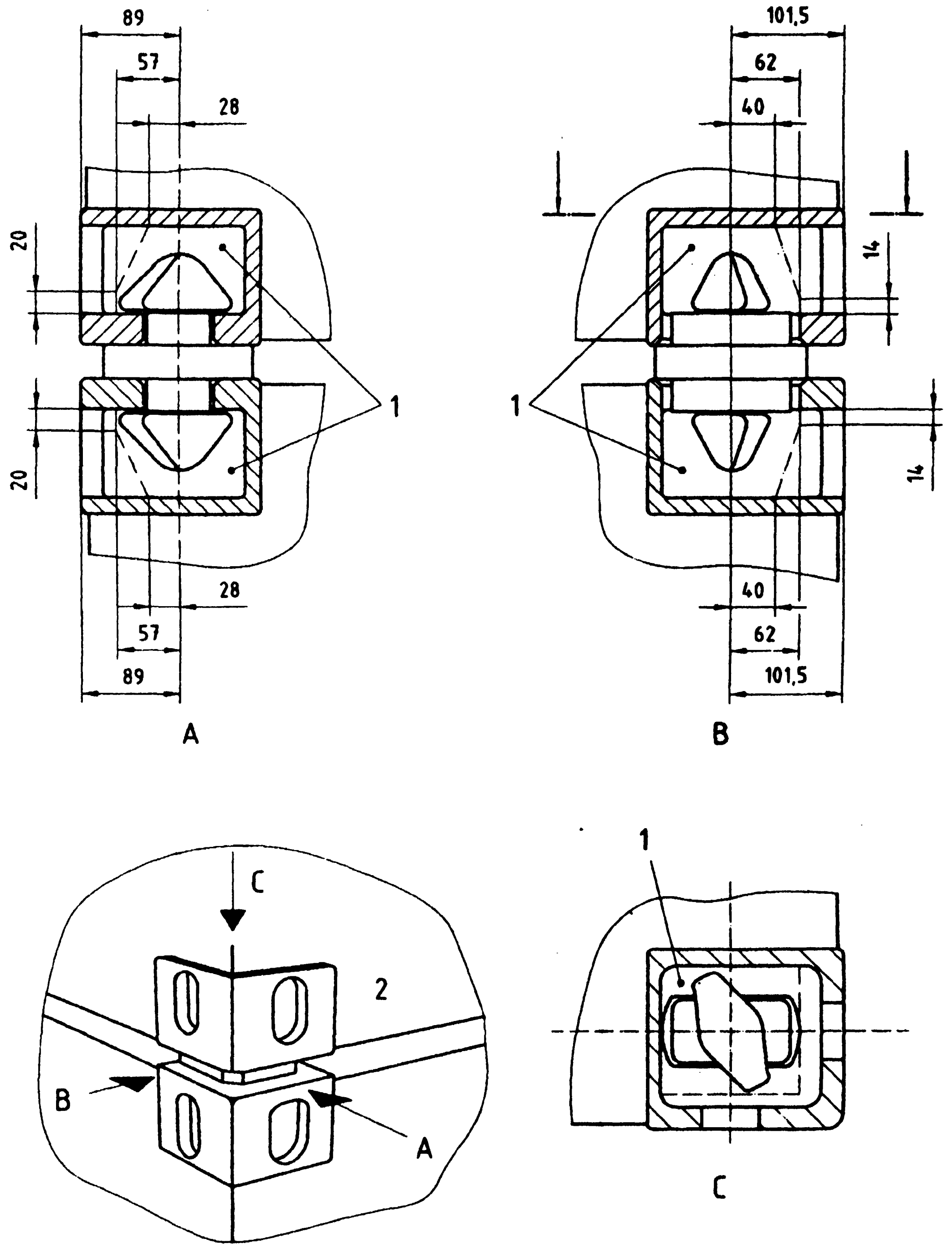
A lashing rod shall withstand a tensile force of 270 kN without any permanent deformation or other abnormalities which would render it unsuitable for use. To verify the tensile strength requirement, test the rods in accordance with D.7.1. The force shall act between the corner fitting and a similar connection that the tensioning device is equipped with. If the lashing rod is designed to be connected to a corner fitting by a securing hook, this securing hook shall be included in the tensile test.

D.6 Tensile strength of tensioning device

A tensioning device shall withstand a tensile force of 270 kN without any permanent deformation or other abnormalities which would render it unsuitable for use.

To verify the tensile strength requirement, test the tensioning device in accordance with D.7.2. The force shall act between the connectioning devices.

Dimensions in millimetres



Key

1 Restricted area

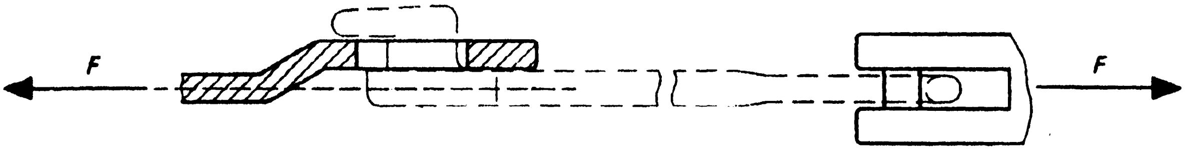
2 Container end

Figure D.7 — Restricted part of corner fitting cavity

D.7 Test methods

D.7.1 Tensile test on lashing rod

The lashing rod shall be subjected to a tensile force of 270 kN for 5 min, without permanent deformation or other abnormalities which would render it unsuitable for use. The elongation shall be measured after these 5 min and the force shall then be increased until rupture occurs. The breaking force shall be recorded. See Figure D.8.

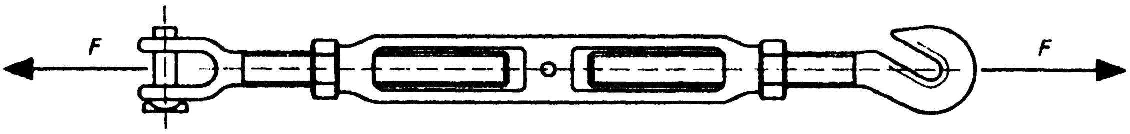


F is the test force.

Figure D.8 — Tensile test on lashing rod

D.7.2 Tensile test on tensioning device

The tensioning device shall be subjected to a tensile force of 270 kN for 5 min and the force shall then be increased until rupture occurs. The force shall be applied through suitable fittings. The breaking force shall be recorded. See Figure D.9.



F is the test force.

Figure D.9 — Tensile test on tensioning device

(TED 12)

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TO
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(Second Revision)

Page 6

Add a new paragraph 6.2.5 after the existing 6.2.4, as follows:

"**6.2.5** The vertical coupling of containers that are not specifically designed as in 6.2.4 for lifting purposes, using twistlocks or other loose gear, is acceptable if forces of not greater than 75 kN1) act vertically through each corner fitting, and the twistlocks or other loose gear used are certified2) for lifting. The twistlocks or other loose gear shall be periodically examined."

Add the following footnotes 1 and 2 at the bottom of the page where the new paragraph 6.2.5 appears:

"1) The value of 75 kN prescribes the minimum structural capability of the lock/corner fitting combination. The 75 kN value includes an arbitrary constant wind load of 26 kN (corresponding wind speed of 100 km/h), regardless of the size of the containers. As an example, the balance of the 75 kN value equates to two 1 AAA containers with a combined tare of 22 kN and a maximum payload of 27 kN. A practical upper limit of three vertically-coupled containers is also envisaged.

2) The certification process envisaged is to use a safety factor of at least four based on the ultimate strength of the material."

ISO 3874:1997, Amendment 1:2000

Page 2, Annex A, A.1

Modify the last sentence as follows:

"Twistlocks are also used to connect and lift containers."

Page 13, Annex B, B.1

Delete the final sentence and replace by the following text:

"Latchlocks may also be used to connect and lift containers, provided that the load-carrying area of the latchlock meets the requirements of B.5.1."

Page 16, B.5.1

Insert the following new sentence between the existing first and second sentences:

"If the latchlock is used for lifting, the load-carrying area shall be not less than 800 mm^2, whether locked at one side or both sides of a corner fitting aperture."

TED 12)

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